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THE REMOVAL OF THE GALL-BLADDER

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IN 165 operations upon the gall-bladder, liver, and pancreas it was necessary to perform cholecystectomy in 21 cases.

The presentation of the histories and pathological conditions will constitute the first part of this paper. In order to be concise I have prepared three charts upon each of which are given the cases, sifted to essential facts so that those interested may read at their pleasure, and only present some notes taken from them.

DIAGNOSIS

Pain is the most constant symptom. Eighteen cases, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, give histories of recurrent colics, or continuous attacks varying from three days' to months' duration, with soreness or tenderness to palpation and, what is most important, definitely localizing in the gall-bladder. Two cases give histories of right-sided pain without localizing symptoms. Each of these had other abdominal conditions. (See case 1 and case 21.) One case refused to admit any great distress except on deep pressure upon a definite tumor of the gall-bladder which rapidly occurred following a fall from which he sustained other serious injuries. (See case 7.)

Inflammatory history. This was obtained in 13 cases. The occurrence may have been remote, recent, or immediate, and we find all of the contracted and useless gall-bladders, the empyemas, and two cases of secondary fistula, one of which might be classed as an empyema, at the first operation. Three of the contracted and useless gall-bladders had also stone in the common duct, all of which gave evidence of chills and high fever. (See cases 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 16, 20.)

Tumor. Seven cases presented a tumor. Pain was very definite (except in the mentioned case of accident), and traced back to a recent attack from which constant distress had continued to time of operation. All of these cases were empyema or cystic gall-bladders due to cystic duct obstruction, except case 6 which was an old thick-walled gall-bladder, felt however, only under an anæsthetic. (See cases 6, 7, 10, 11, 16, 17, 19.)

Time. Histories run over greatly varying periods. Symptoms have been present for 30 (2), 21 (3), and 15 (8) years. All of these have shown the contracted gall-bladder, the result of inflammation, and only come to surgical interference when septic changes or common duct obstruction occurs. The shortest time was case 7, 10 days.

Age. This ranges from 25 years to 74. By decades: two in the 20; six in the 30; six in the 40; one in the 50; five in 60; one in 70. In several of the older patients their first attack occurred in middle life.

Sex. Four cases were male and 17 female.

Stones. These were not found in the gall-bladder in four cases. (See cases 5, 7, 8, 14.)

In case 8, there was a stone in the common duct, without stones in the gall-bladder. Stones were found in the common duct in 3 cases (see cases 2, 3, 8), and opened once more for exploration in case 16.

Jaundice. Six histories give evidence of jaundice. (See cases 2, 3, 8, 13, 16, 17.) As will be seen these occurred in all of the common-duct patients and in three others in each of which a stone plugged the cystic duct.

Perforation. This has occurred three times (see cases 2, 5, 12), once into the duodenum, once to form a liver abscess, and once to form an abdominal and subphrenic abscess.

OPERATIVE MEASURES

Second operation. The gall-bladder was removed at second operation twice, once when a sacculation was overlooked, the other where it was impossible during the first operation to dislocate the liver, and although cholecystectomy was indicated, this was postponed on account of the patient's condition.

Drainage. The cystic duct was tied with gauze or cigarette drain down to the stump 9 times. (See cases 1, 5, 6, 7, 11, 15, 17, 19, 21.) Twice twin tubes were used, one in the cystic duct, the other by its side in the common duct. (See cases 3 and 4.)

In one case it was impossible to employ these methods and the forceps were left "in situ" for 2 days. (See case 18.)

Two cases had a secondary drain through the loin. In all the remaining 9 cases the cystic duct was tied.

Pathological conditions. Employing the scheme of Mayo Robson (See British Med. Journal, 1906, vol. 1, p. 431), we find the cases classify themselves under the following heads:

1. Cancer and other new growths where disease is local and limited. No case.

2. Contracted and useless gall-bladders, the result of repeated attacks of cholecystitis. (See 1, 2, 3, 4, 5, 8, 12, 13, 14, 20) — 10 cases.

3. Dilated and hypertrophied gall-bladders, resulting from obstruction in cystic duct: (*a*) Always if resulting from stricture. (See 15, 21) — 2 cases. (*b*) Usually if resulting from impacted stones which may have induced ulceration that will eventually lead to stricture.

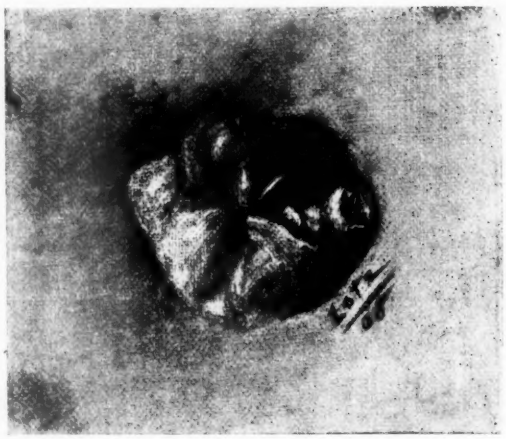


Fig. 3. Case 4. Age 60. Shows small gall-bladder contracted tightly on stones. Acute and recent inflammation history.

(See 6, 17, 18, 19)— 4 cases. (*c*) Usually if resulting from kinking of cystic duct, or from adhesions. No case.

4. Phlegmonous or gangrenous gall-bladder. (See 7)— 1 case.

5. In empyema. (See 10, 11)— 2 cases.

6. Calcareous degeneration of gall-bladder. No case.

7. Mucous fistual, the result of stricture or other obstruction of cystic duct. (See 9, 16) — 2 cases.

8. Gun shot or other serious injuries of the gall-bladder or cystic duct. No case.

RESULTS

Three deaths have occurred, 14 per cent plus. (See cases 4, 11, 14.) Two of these (4 and 14), were contracted and useless gall-bladders with marked and recent inflammatory history. The third (see 11) was empyema.

Autopsy was done in case 14, the only information which has been received was to the effect that there was no hæmorrhage or inflammation. One case had signs about the gall-bladder $3\frac{1}{2}$ years following her operation; this was one year ago and a recent letter reports her as well. The other cases have remained well so far as we are informed and are among our most grateful patients.

Symptoms of gall-bladder disease are in the majority of cases definite. And while it is not

an uncommon fact that we find gall-stones and gall-bladder conditions during the process of other abdominal operations, nevertheless by going over the histories with the patients themselves after the operation has been performed, we can invariably elicit symptoms of their presence. Either the patient has forgotten to mention them in reporting symptoms of other conditions or a misinterpretation has been placed upon them by the questioner. From the study of these 21 cases of gall-bladder removal, we find that all give definite histories and the operation was undertaken as a primary procedure, except in two cases where the symptoms were ascribed to other abdominal conditions. Pain is most constant and may take on many forms. When remittant, colic, in which the pain disappears as suddenly as it occurs, suggests the ordinary gall-stone disease. Pain coming on suddenly or gradually and continuing without definite remission suggests the involvement of the cystic duct. Such a history with the objective signs of tumors with or without inflammatory reaction makes a definite diagnosis of an attack of impacted stone. Inflammatory history extending over a period of years usually results in a contracted gall-bladder. Chills and fever is one of our most definite signs of common-duct involvement although this may occur in empyema, or in the initial stages of an acute cholecystitis. Jaundice occurred in only six cases of these 21 gall-bladder cases, three in which the stone was in the common duct and three in the cystic duct, proving that jaundice is merely a sign of obstruction and has but little other value in the diagnosis of the probable pathological condition present.

It is interesting to note that three of the cases had symptoms for 30, 21, and 15 years and were in comparative good health and practically cured themselves until the common duct had become involved with such severe illness that they were glad to accept surgical relief, and we mention this in the belief that these three cases may be used as evidence that gall-bladder conditions sometime or other in the vast majority of cases will demand surgical relief.

The gall-bladder was removed in three cases in which the common duct was involved but were all of the contracted and useless type and when it would have been impossible to have used them in any subsequent operation, if it had been found necessary to perform such. We believe in leaving the gall-bladder in common-duct cases, for the purpose of cholecystenterostomy if indicated. In nine cases the cystic duct was drained and in nine it was tied. We believe that both procedures are correct, and are to be selected by the operator for the individual cases. Two cases were operated upon the second time, and it was a matter of comment that although the work of the surgeon was very difficult the patient withstood the operation much better than the first.

The greatest interest in the pathology of the gall-bladder is contained in the gross changes. Although each specimen should be studied histologically for malignancy, such investigations usually result in demonstrating different degrees of changes resulting from infection or circulatory interference. No specimen of our series was removed until it was definitely shown that the function of the organ was irreparably damaged. H. P. RITCHIE.

It is difficult to lay down rules by which one may know when a gall-bladder should be removed, and when it should not. The fear that a certain patient might some time in the future have to undergo another operation, and that such an occurrence would be considered a surgical blunder on the part of the operator, has been the cause of removal of many organs which might otherwise have been saved. To prove that considerably diseased gall-bladders recover and give no trouble for long periods of time let me quote a few cases:

1. A case operated upon in '99, had a somewhat contracted gall-bladder, containing 30 medium sized, old, black stones, no bile, and at least one drachm of thick pus. She had a stormy convalescence, and was not well until three months later when she passed from the fistula another stone evidently overlooked at the time of the operation. She reports herself as perfectly well to-day, having had no trouble since her operation nearly ten years ago.

2. Mrs. H. A cystic gall-bladder where from the history I was led to believe that the cystic duct must have been obstructed by stones for 3 weeks, operated upon 9 years ago; perfectly well to-day.

3. Miss L. Case of Dr. Frost's cystic gall-bladder, one ounce of clear fluid not even bile stained and three large stones; no trouble after two years.

4. Mrs. C. Small contracted, universally adherent, thick-walled gall-bladder, necessitating digital dilatation before I could remove 3 moderate sized stones from the cavity, one stone also removed from the common duct. This operation was in September, 1901. She lived 5 years never having any further trouble from her gall-bladder, to die from cerebral embolism.

5. Mrs. McN. Operated upon in October, 1901; chronic cholecystitis; gall-bladder contracted and adherent; one small stone in the gall-bladder; she passed a similar stone a few days befre. At the time of the operation I thought she had a carcinoma of the pancreas from the size and stony hardness of that organ. I *fortunately* drained her gall-bladder; and *that night* found Mayo Robson's first reprint on chronic pancreatitis. She has been perfectly well ever since her operation.

6. Mrs. M. Operation April, '00; gall-bladder thickened and adherent. One hundred and ninety-six stones were found, one moderately sized stone was wedged in the cystic duct; after the operation there was no discharge of bile, and a fistula resulted. Ten months later a stone was found and removed from the common duct. It was noted at that time that the gall-bladder was thickened and adherent. Six years later, or January, 1907, she came to me with a tumor in the region of the gall-bladder, saying that she had been quite well, but had commenced suffering pain in the gall-bladder region for the past three or four months. An exploration demonstrated carcinoma of the gall-bladder, mesenteric glands, and liver which could not be removed. She lived only a few months.

7. D. A. F. Had been sick two weeks with typhoid; five days before the operation he had chills with a temperature of 105 followed by a slight jaundice, with a tumor in Robson's point, acute colecystitis and cholangitis and empyema of gall-bladder, 130 stones, one the size of a small hen's egg, impacted in the cystic duct. Two weeks later he gave a positive Vedal's reaction. His typhoid gradually subsided lasting in all over six weeks. He had a wound suppuration and except for a ventral hernia has been perfectly well ever since, gaining 60 pounds in the next year's time. Two years later I operated upon this man for ventral hernia, at that time I had a chance to examine his gall-bladder, there was no apparent disease or re-formation of stones, in spite of the fact that the gall-bladder was adherent to the anterior abdominal wall and to the deodenum.

8. Mrs. B. Had a very large gall-bladder, the size of a baby's head with a dark necroatic spot in the fundus; no bile in the gall-bladder; the bile commenced to flow on the seventh day.

I can also recall several cases when after drainage of the cystic gall-bladder and removal of the obstructing stones in the cystic duct, the bile did not commence to flow from the drainage tube until the fourth or even up to the seventh day, and still the patient recovered and most of them had no trouble of any kind from the gall-bladder since.

Of course there are cases in which the gall-bladder is so markedly diseased that there is no question as to the necessity of removal, for instance in carcinoma, extensive gangrene, or calcareous degeneration; any one no matter how limited his experience, would know that such gall-bladders ought to be removed. But how about the border line cases? The cystic gall-bladder where the stone has only been impacted *a few days*? When only *a small* spot of gangrene affects the fundus of the gall-bladder? Or a *moderate* sized perforation exists? These are the cases in which it is difficult to decide what is best to be done. In Mr. Moynihan's last book he takes the position that cholecystotomy is a drainage operation, that by doing a cholecystectomy he removes the necessity for drainage,— and that he is coming to the belief that cholecystectomy should be done more frequently. I should feel perfectly safe to have any member of my family in Mr. Moynihan's service and know that they would receive the very best care, but when other operators of less experience and less skill go further than Mr. Moynihan and advise the removal of every cystic gall-bladder and almost every gall-bladder containing gall-stones, it seems well to call a halt. My experience is limited but when such men as Mayo, Deaver, Richardson, and Murphy, and a host of others agree that the mortality of cholecystectomy is greater than cholecystotomy and that in case of future trouble it is safer for the patient if his gall-bladder has not been removed, I feel that Deaver is right when he says: "In case of doubt, *drain*."

Mayo makes this point very strong in his last article read before the Mississippi Valley Medical Association in October last, when he states that 7.6 per cent of their gall-bladder cases have shown complicating inflammations of the pancreas,— that on account of the difficulties of secondary drainage where the gall-bladder has previously been removed, he only removes the gall-bladder in the presence of pancreatitis when there is malignant disease of the gall-bladder or permanent obstruction of the cystic duct. He also says that he has come to the conclusion that in such cases, especially if there is a dilatation of the common duct, a much larger proportion of cases, with

or without stones should be treated by cholecystenterostomy than has been the custom in the past. The adhesions which form after any gall-bladder operation are often very dense and very extensive, more so after cholecystectomy than after the simpler operation of cholecystotomy.

To illustrate the difficulties in a secondary operation on the gall-bladder:

Mrs. B. Six weeks before I saw her commenced to have a high temperature and chills with intermittent jaundice, after the most careful search, I could not find a stone in the common duct, although I was sure that I was going to find one. There was a cholecystitis with extensive adhesions, 10 old, black stones and bile in the gall-bladder: cholecystotomy. The fistula would not close; when there was an attempt at closure, she would have chills and high fever again. Four months after the first operation, the patient having been confined to the hospital and in bed the most of the time, I made a diagnosis of obstruction to the common duct, probably stone, and opened her again. I found a large dilated gall-bladder containing fully a pint of bile, universal very dense adhesions; after tearing the liver, breaking up some of the adhesions, and not being able to even demonstrate the stomach nor the duodenum, let alone the common duct, on account of the profuse hæmorrhage, in order to get her off the table alive I had to make a cholecystenterostomy with the transverse colon with a button. She was much improved for six months when the fistula gave evidence of closing. She refused any further operation. The gall-bladder was ruptured and she died of peritonitis. It would have been better for this patient perhaps if I had used a suture instead of the button; but the suture openings also tend to close. It seems as though there was too little material passing through these false openings to keep them open, and they are especially apt to close if there is any traction upon the point of union.

Concerning the mortality of cholecystectomy, Mr. Moynihan says that in judicially selected cases the risk is not greater than after cholecystotomy, and that in several cases the operation was simpler than in cholecystotomy.

The mortality of cholecystectomy like that of any other operation is due to that man's own experience; we are apt to look at the record of others and tell our patients that the dangers of such and such an operation are reduced to 2 or 3 per cent, forgetting that the man whom we are unconsciously quoting has only attained his 2 or 3 per cent by a greater experience than our own, but no doubt through bitter trials and losses which ought not to have occurred. Mayo Robson in 1904, in his third edition, reports 28 operations for cholecystectomy with 4 deaths, 14.2 per cent mortality. My own is 21 with three deaths, 14.2 per cent mortality. My mortality is high at this time. Robson's was not high four years ago, at that time Mayo's was 6 per cent, Terrier's, 25; Crovoisierer's, over 25 per cent; Delageier's, 23 per cent, while Mayo's to-day is less than 2 per cent in his last 500 operations.

An irrelevant point in the general mortality of gall-bladder cases was impressed upon my mind in studying up my statistics for this paper namely that three deaths have occurred in a series of 20 combined operations where in the presence of some pelvic tumor gall-stones have been found and removed at that time through a stab wound over the gall-bladder, instead of making a secondary opening or putting them off to a better and safer time. One of these cases died as a result of a secondary bleeding from a myomectomy wound and the death I am sure had nothing to do with the gall-bladder operation, but as the two were combined, they must stand the death in truthful statistics, because I may have been mistaken in this opinion, and there was no mistake about the woman's death.

I have recently come to the conclusion that the removal of gall-stones through a stab is seldom justifiable, and that only under the most favorable conditions will I ever do it again.

The principal reason in my mind for writing this paper is to impress the young man who is thinking of starting in gall-bladder surgery with the fact that the mortality of gall-bladder operations will not *be 2 per cent* in his hands, and not likely to be anywhere near that point until he has done several hundred gall-bladder operations.

Then in conclusion let me state the negative side of this question: Under what circumstances should we not perform cholecystectomy?

1. In a cystic gall-bladder when from the appearance and the history it is quite certain that the obstruction of the cystic duct is recent even though the gall-bladder does not contain bile.

2. In calcareous disease or gangrene of a small portion of the fundus of the gall-bladder.

3. In moderate sized perforations or wounds.

4. In moderately adherent and "somewhat" contracted gall-bladders.

5. In the presence of pancreatitis, especially if complicated with dilatation, stone, or other disease in the common duct. A. MacLaren.

No.	Sex	Age	Previous History	Recent History	Date of Operation.	Op. Procedures	Pathologic Conditions	Convalescence	Result
1	F.	49	Never pregnant. "Inflammation of bowels," soon after marriage. Credit, Dr. Townsend, Dacorah, Ia.	Colic one year ago. Found tumor in abdomen growing worse.	Sep. 22, '03. St. Luke's.	Hysterectomy, Appendectomy Cholecystectomy. Gauze drain to stump of duct and in raw surface of liver.	Pedunculated and interstitial fibroids. Cystic appendix and mucopus gall-bladder walls thickened. Packed with stones. No bile. Stone impacted in cystic duct.	Convalescence immediate and uneventful. Recovered.	Jan. 22, '08, cured.
2	F.	61	Four children, youngest 23. Thirty years ago severe colic for several years, then free for 20 years. Credit, Dr. Gervino Balston.	Recently, jaundice, clay-colored stools and constant distress.	March 18, '04. St. Luke's.	Cholecystectomy, Choledochotomy tube into common duct.	Cholecystitis. Perforation into duodenum. Dense adhesions. Three stones in common duct. One stone at lower end of duct crushed with finder and detritus scooped out.	March 20, bile flowing freely. March 26, clay colored stools. Recovered.	Oct. 11, '04. burning in wound. Dec. 12, '07, some signs of obstruction. Dec. 1, '08, well.
3	F.	51	Never pregnant. First severe attack 21 years ago. Few mild attacks before marriage. Credit, Dr. Hopkins, Cumberland, Wis.	For last 15 years slight attacks "off and on" during last few weeks, Chills and fever and jaundice.	Mch. 29, '04. St. Luke's.	Appendectomy, Cholecystectomy, Choledochotomy, Common duct entered and drained through cystic duct.	Chronic obliterative appendicitis, Chronic obliterative cholecystitis. Gall-bladder size of cherry. One stone in common duct.	Severe emeses for 3 days. Recovered.	Dec. 12, '04, gained 37 lbs. Pain in side, Nov. 10, '05. Gained. May 13, '07, cured.
4	F.	60	Several children. Well active life, Credit, Dr. Nickerson, Glencoe.	Denies Gall-bladder symptoms until 2 weeks ago and when taken with chills, fever and evidence of local peritonitis, very ill upon arrival at hospital. Watched 2 weeks before operation.	Oct. 6, '04. St. Luke's.	Cholecystectomy, Common duct split and explored with probe down to intestine. No stones in common duct. Duct drained with tube and gauze. One gall stone through kidney pouch.	Chronic obliterative cholecystitis. Dense adhesions. Gall-bladder small and full of stones. See Specimen. Fig. 3.	Never rallied.	Died Oct. 7, '04.
5	M.	25	Operation Sep. 12, '04, for acute appendicitis, followed by frank lobar penumonia very ill. Recovered, well 2 months. Credit, Dr. Ramsey, St. Paul.	Two months following appendectomy, had frank attack of cholecystitis with pain and fever locating in gall-bladder region. Vomiting continuous. No jaundice.	April 6, '05. St. Luke's.	Cholecystectomy. Cystic duct dilated. Resected rib.	Perforation of Gall-bladder forming liver abscess. No stones. No bile. Bladder walls thickened.	Vomiting continued violent 6 days. April 12, '08, posterior gastro-enterotomy.	Recovered Fistula some months. Nov. 1, '08, in perfect health.
6	F.	49	Four children, Many attacks of gall-bladder colic, otherwise well. Credit, Dr. Kilbride, Canby, Minn.	Last attack 4 weeks ago. Pain and local tenderness ever since. Tumor under anaesthesia.	May 2, '05. St. Luke's.	Cholecystectomy. Cystic artery and duct ligated. Two gauze drains tied in place with ligature.	Chronic cholecystitis. Stone impacted and structure of cystic duct. Ten small yellow gall stones. Gall-bladder thick-walled, containing brownish viscid fluid.	Slight suppuration about drain.	Recovered.
7	M.	60	Well, vigorous life. Recently married. Young family. Credit, Dr. Clark, White Bear.	While shingling roof fell to ground and sustained comminuted fracture of left elbow and ramus pubis. While convalescent had severe pain over gall-bladder with development of tumor.	June 26, '05. St. Joseph's.	Cholecystectomy. Drain to stump of duct with gauze.	Gangrene of gall-bladder filled with blood and under great distension.	Uneventful and immediate. Recovered.	Jan. 23, '07. "Never felt better in his life." Nov. 1, '08, well.
8	F.	60	Widow 13 years. Children 15 years ago had attack like this. Credit, Dr. Crommelt, Amory, Wis.	Three mths. has had jaundice, chills and fever.	Sep. 1, '06. St. Luke's.	Appendectomy. Cholecystectomy, Choledockotomy. Stone removed. Tube in common duct.	Chronic appendicitis. Gall-bladder small and thickened, full of putty. Like material. Stone in common duct.	Rapid and uneventful.	Recovered.

No.	Sex	Age	Previous History	Recent History	Date of Operation	Op. Procedures	Pathologic Conditions	Convalescence	Result
9	F.	40	Has several children. History of gall-bladder inflammation, Credit Dr. Kelly, Canby, Minn.	On Sep. 19, '08, Cholecystectomy was done. No stones found. A week following, discharged several stones. Distress constant.	Oct. 23, '06, St. Luke's.	Cholecystectomy. Drainage of cystic duct stump with tube.	Valve-like curtain of M. M. at opening of cystic duct allows bile to enter but not to leave. M. M. granular.	Nov. 9, 08. Colic. Recovered.	Cured.
10	F.		Attack of colic, 14 years ago. Several colics since. Credit, Dr. Hunt, Northfield.	Last 10 days tenderness over gall-bladder. Temp. 103, Tumor ever since.	Nov. 21, '06. Northfield.	Cholecystectomy, Gall-bladder divided to syctic duct. Liver torn. Tube drain in stump of duct. Three gauze strands. Appendectomy.	Chronic appendicitis. Empyema gall-bladder, 25 stones. One in cystic duct.	Uneventful.	Cured.
11	F.	61	Was operated on May 25, '06, for complete procidencia. Attack July, '07, pain and fever. Sick several days.	Attack beginning Feb. 22, '07, continuous to date. Tumor.	Mch. 13, '07. St. Luke's.	Cholecystectomy. After aspiration of Gall-bladder. Drained by gauze down to stump through stab wound.	Empyema gall-bladder. Thick pus. Adhesions about gall-bladder. One stone in cystic duct.	Very sick — nausea and vomiting. Sudden, profuse flowing of bile.	Died April 16, '08. Peritonitis and bile poisoning.
12	M.	45	Abdominal abscess opened which discharged bile in a few days. Second operation in which large sub-phrenic abscess was drained through pleural cavity. Well for mths., but returned because of colic.	One colic but some constant distress over gall-bladder since operation.	April 3, '07. St. Luke's.	Cholecystectomy. Tube drain of cystic duct.	Chronic obliterative cholecystitis with extensive adhesions of gall-bladder and liver.	Uneventful and immediate.	Recovered. Oct. 1, '08, cured.
13	F.	45	One child, 18 yrs. Several mild attacks. Credit, Dr. Talbot-Jones, St. Paul.	Severe attack Jan., '07, lasting 27 hours. Temp. jaundiced, sick ever since.	July 9, '07. St. Luke's.	Appendectomy, Cholecystectomy. Tube in stump of cystic duct.	Chronic appendicitis. Chronic Cholecystitis. Gall-bladder, liver and surrounding peritoneum, hard and indurated, suggesting malignancy. One stone in cystic duct. Gall-bladder contained necrotic tissue and granulation.	Jaundiced several days.	Recovered. Oct. 9, '07, gained 20 lbs. July 1, 08, cured.
14	F.	36	Three or four previous attacks of gall-bladder disease and usually very sick. Credit, Dr. Merrill, Stillwater.	Present attack Sept. 1, '07. Chills, temperature 104 and signs of peritonitis.	Oct. 26, '07. Stillwater, City Hosp.	Cholecystectomy. Tube and gauze through stab wound.	Cholecystitis, obliterative. Gall-bladder very small. Dense adhesions. No bile. No stones.		Died in 36 hrs. Post-mortem. No bleeding nor inflammation.
15	F.	35	Married 8 years. No children, Gall-bladder colics began 2 years ago.	Recurrent colics. Considered the operation a long time.	Nov. 5, 07. St. Luke's.	Cholecystectomy. Cystic duct ligated. Strands tied in.	Chronic Cholecystitis with 6 small stones. Ulcer encircling M. M. of cystic duct. A little bile in gall-bladder.	Persistent vomiting for 6 days.	Recovered. Dec. 7, '08, well.
16	M.	74	Biliary colic with chills, lasting over a year. Nephritis, jandice. Credit, Dr Parks Ritchie, St. Paul.	Operated May, 4, '07, to find Cholecystitis with large thickened gall-bladder, peritonitis, 3 large and 22 small stones. No stones in cystic duct. Gall-bladder should have been removed but deemed inadvisable. Wound supp. continuation of chills and colic.	Jan. 2, 07. St. Luke's.	Cholecystectomy, dividing gall-bladder from fundus to common duct, which was explored with scoop. No stones.	Cystic Gall-bladder unusual dense adhesions. No stones. Sacculation of gall-bladder at cystic duct.	Stormy wound Supp. nephritis in severe degree.	Recovered. Dec. 9, '08, well.

No.	Sex	Age	Previous History	Recent History	Date of Operation	Op. Procedures	Pathologic Conditions	Convalescence	Result
17	F.	29	Well until 19 mos. ago, when colics began, when last child was 3 weeks old. Colics recurrent but distress all the time. Credit, Dr. H. C. Johnson, St. Paul.	Growing worse. Tumor felt last few weeks. Jaundice, Jan. 26, '06.	Jan. 26, '08. St. Luke's.	Cholecystectomy. Cystic duct tied. Gauze drain through stab and thro' liver. Appendectomy.	Cystic Gall-bladder thick-walled with necrotic spots. Stone in cystic duct. None in common. Ch. Appendicitis. Three enteroliths.	Easy and uneventful.	Recovered. Well.
18	F.	34	Operation upon July 2, '04, for pelvic abscess following miscarriage, tedious convalescence. About a year following began having colics, growing worse. No temp. Credit, Dr. A. Whitcomb, St. Paul.	One recent attack lasted 10 days, worst of all.	Mch. 2, '08. City Hosp., St. Paul.	Cholecystectomy. Very difficult, could not dislocate liver. Clamp on cystic artery and duct. Left gauze drain, Mch. 4, '08, forceps removed.	Gall-bladder red with necrotic spots. Adhesions all over liver. No bile. 126 stones, one in cystic duct.	No bile until removal of clamps with sudden flooding of bile.	Recovered. Well.
19	F.	30	Two children, youngest still nursing. Indigestion past year. Credit, Dr. J. S. Kilbride, Canby, Minn.	Present attack began 10 days ago, soon noticed tumor.	May 22, '08.	Cholecystectomy. Tube and gauze drain to stump, but cystic duct tied.	Cystic gall-bladder. Stone in cystic duct. Thirty stones. Muco-pus. Gall-bladder wall thick and necrotic.	Chill. Temp. 104 evening of op. One day only.	Recovered. Well.
20	F.	48	Thirteen children. Operated for acute supp. appendicitis 9 months ago. Credit, Dr. J. S. Kilbride, Canby, Minn.	Constant abdominal distress since operation. Evident ventral hernia at site of app. wound.	Aug. 5, '08.	Herniotomy, Appendectomy, Cholecystectomy. Cystic duct drained.	Thick-walled Gall-bladder contracted down upon 500 old stones.	Erysipelas infection about wound.	Recovered.
21	F.	39	One child. Pain in right side last year. At no time colics, Lac.C. & P. Retroflexion.	Considered operation some time.	Oct. 3, '08.	Repair C. & P. Ventro-suspension. Cholecystectomy.	Gall-bladder condition found by intra-abdominal examination. Gall-bladder full of stones one about to come through cystic duct obliterated. No bile.	Immediate and uneventful.	Recovered. Well.

THE OPERATIVE TREATMENT OF SIMPLE FRACTURES

By W. ARBUTHNOT LANE, M. S., F. R. C. S.
Surgeon to Guy's Hospital, and Senior Surgeon to Hospital for Sick Children, Great Ormond Street, London, England

SIXTEEN years have elapsed since I made it my habit to operate on all cases of simple fracture of the long bones in which I was unable to restore the fragments to their normal relationship and in which it was important to the individual that his mechanics should not be impaired by the injury.

In 1894 I brought before the Clinical Society of London a paper dealing with the results of the treatment of simple fractures by operation. In it I pointed out that operative measures offer to the patient the following advantages:

"(*a*) They at once relieve the patient from the pain of any movement of the fragments upon one another.

"(*b*) They free him from the tension and discomfort due to the extensive extravasation of blood between and into the tissues.

"(*c*) They shorten the duration of the period during which he is incapacitated from work, since union is practically by first intention, and, consequently, very rapid and perfect.

"(*d*) Lastly, and by far the most important, they leave his skeletal mechanics in the condition in which they were before he sustained the injury."

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

In that paper I gave the reasons according to which I advised operation in suitable circumstances, and appended a list of results of cases, treated by manipulation and splints, which were most unsatisfactory. These were taken in sequence from the reports of the hospital, and extended over a considerable period of time.

This, and the papers which I wrote later, raised a storm of opposition, and have practically continued to do so up to the present time.

The conclusions which I arrived at as to the prognosis of fractures were briefly the following:

1. That accurate, or anything approaching accurate, apposition of displaced fragments in a fracture was obtained in only very rare cases.

2. That the treatment of fractures, as it existed, was a disgrace to surgical practice, because those who had sustained fractures.

Fig. 5.

Fig. 6.

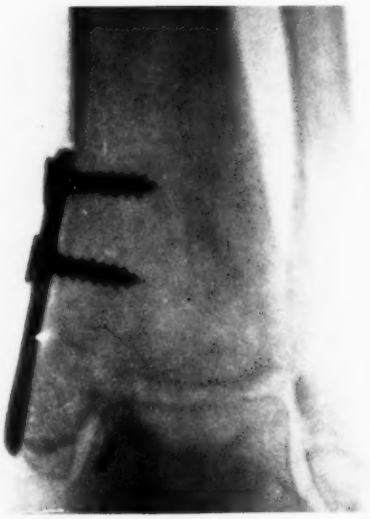


Fig. 7.

Fig. 8B.

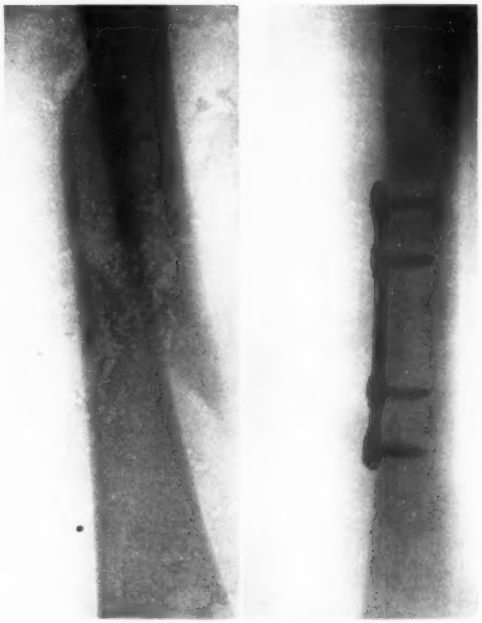
especially of the leg, only too often experienced enormous physical disability. When dependent on labor for their income, they frequently suffered great financial depreciation in their wage-earning capacity. In not a small proportion the depreciation in certain occupations amounted to a hundred per cent.

All my subsequent experience of fractures, treated by means other than operative, has fully borne out the accuracy of the statements which I then made.

I think it may be of some interest to indicate what I consider the best and safest means for establishing continuity of fractured bones.

Fig. 8A.

Fig. 9.



Figs. 10 and 11A.

It is obvious that since a considerable quantity of metal must be left in the wound in order to effect accurate and firm apposition, it is necessary that much greater aseptic precautions must be adopted than in ordinary operations when such is not the case.

To ensure that the wound shall be as sterile as possible, great precautions are taken to get the skin clean. This is particularly called for in operations about the leg as in the hospital patient much thick epidermis exists in certain localities.

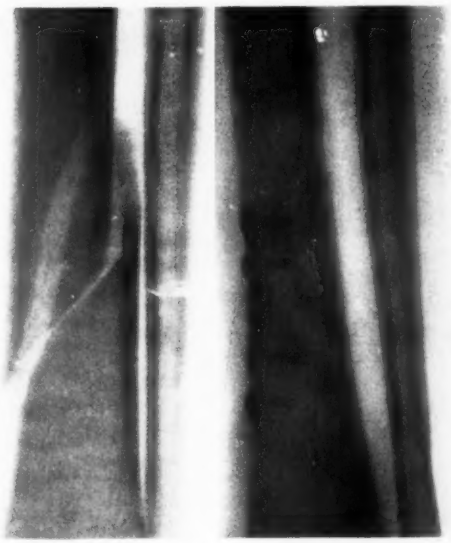
During the operation it is arranged that the skin of the patient shall be excluded from contact with the wound. This is effected by attaching a sterile cloth to the under surface of the divided margin of the skin by means of specially constructed forceps. Although gloves are always worn neither the surgeon nor his assistants touch the wound with the hand nor is any portion of an instrument which has been touched by the hand introduced into the wound. All swabs are manipulated by means of long dissecting forceps.

The compression forceps for controlling hemorrhage are sufficiently long to prevent any contact of the handles with the wound, and they are strong enough to obliterate the circulation and render the use of ligatures and drainage tubes unnecessary. These precautions are taken as a minute hole might exist in the rubber glove through which contaminated fluid might be ejected into the wound during the forcible movements which are so often necessary.

All the implements employed for approximating and fitting the fragments, drilling holes, holding screws and driving them in are all very long and very powerful and are specially constructed for the purpose. By adopting these precautions it is possible to perform any such operation with absolute safety.

In making the incision the fracture should be approached from an aspect which necessitates a minimum of damage to soft parts, and in closing the wound care should be taken when necessary to unite the margins of the deep fascia by means of gut ligatures.

As to the best means of retaining the fragments securely together when accurate apposition has been effected, I have employed various means. At one time I used wire and



Figs. 10 and 11B.

Figs. 10 and 11C.

on certain rare occasions I still do so when for one reason or another a more effective appliance cannot be employed. Wire is unsatisfactory because it forms a curve and cannot effect a firm and accurate apposition when a force tending to displace the fragments upon one another continues to be exerted. Again the knot projects and is often difficult to bury, and the wire occasionally breaks without the fracture being observed. Therefore I never use wire when I can use screws.

A screw is the most effective means we have at our disposal for retaining accurately opposed fragments immovably upon one another. For many years I depended entirely on screws with great success. The employment of the screw alone presents certain serious difficulties. It must perforate both the proximal and distal compact tissue. In many conditions it is difficult to find the hole that has been bored in the distal compact layer, or the bone may be comminuted and that portion of distal compact through which the thread of the screw should pass may be loose and of no service for securing the fragments.

Finally, except in special cases where the use of a long screw is unavoidable, as, for instance, in fractures of the neck of the femur, I employ a long steel plate, rigid or flexible as the case may require, and screws which are $\frac{1}{2}$ to $\frac{5}{8}$ inch long threaded up to their heads and in two gauges, 5 and 7. In operations on young infants 3 gauge is frequently employed. In using these short screws only the proximal compact layer is used; and as there is no necessity to approximate surfaces of bone the absence of the barrel of the screw is immaterial while a more secure grip of the proximal compact layer is obtained.

The plate employed is long and is perforated by a number of holes so that it can be secured to the bone by as many screws as possible.

In some conditions, as in fracture of the patella, a pliable plate is necessary since it wants to be slightly curved to fit the anterior convex surface of the patella. In fractures of the olecranon and in some fractures of the tibia and fibula especially it is very advantageous to have a pliant plate. As a rule, however, the rigid plate is much the more generally useful and in combination with screws forms in my experience the best means for retaining the fragments in accurate apposition.

The surgeon should so attach his plate that it does not form a projection beneath the skin as in that case it may become a source of pain or inconvenience and may call for removal at a subsequent date. This is easily effected in

Figs. 10 and 11D.

Fig. 10E.

the case of a long bone like the femur where there are abundant soft parts to cover and shelter it, but in the case of spiral fractures of the femur it is somewhat more difficult to do this while in some cases it is impossible. If such is the case the plate employed should be as thin as possible. If a thick plate must be employed in such circumstances it is better to remove it after union has taken place, when it is of no further use.

I would mention that although I have employed screws and wire perforating bones for many years I have no personal experience in my own practice of the rarefying osteitis which is said to exist in these circumstances and is regarded by many as an objection to the employment of foreign bodies perforating bones. Indeed the objection to the use of such means by some is so strong that they advise that wire should be used to encircle fragments and retain them in apposition. Anyone who has the slightest experience of these operations must recognize the absurdity of the suggestion. Although I have no experience of the presence

Fig. 11E.

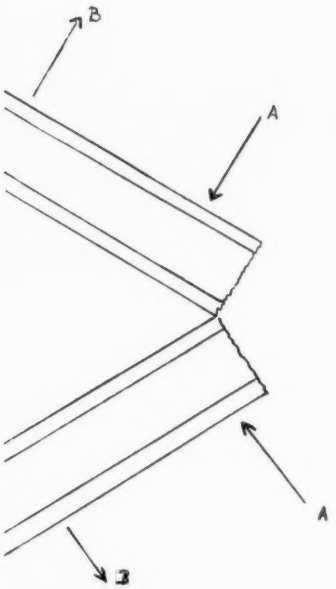


Fig. 12.

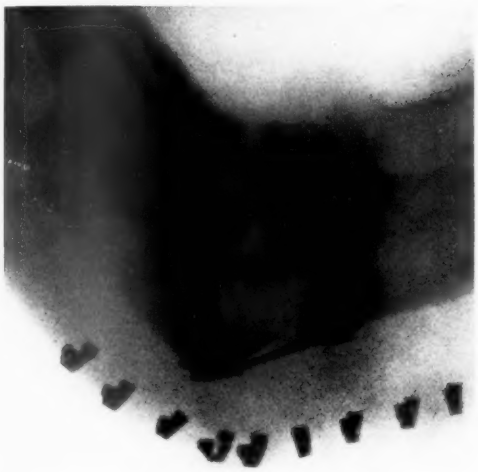


Fig. 13B.

of a rarefying ostitis in operations on simple fractures in my own practice I had abundant experience of it in such cases as have been operated on unsuccessfully by others. I should say that rarefying ostitis occurs from injection of the wound due to want of proper precautions or to the use of some mechanism that does not immobilize the fragments. I need not show photographs to illustrate the former causation as they are unfortunately only too frequent. Fig. 1 is an excellent illustration of the latter, and Fig. 2 shows that if efficient means be adopted the same bones even after the lapse of much time and even when wasted from want of use may be joined securely and a perfectly useful limb obtained. In Fig. 2 a portion of the area of bone affected by rarefying ostitis is shown in either fragment, yet its presence has in no way interfered with a perfect junction. Figs. 3 and 4 show a similar case. I might multiply such illustrations indefinitely, all of which demonstrate the utter fallacy of the statements that are made by many well-known surgeons, but which are founded on no basis of truth whatever.

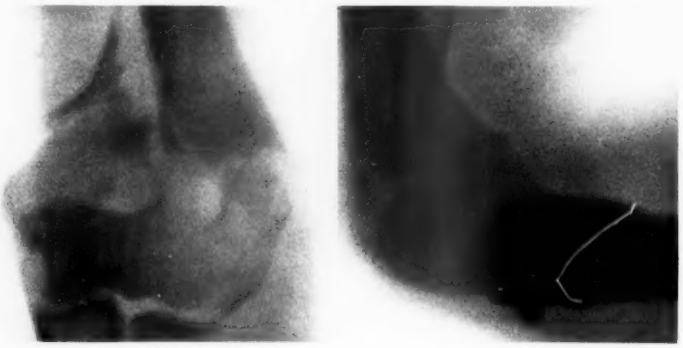


Fig. 13A.

Fig. 14A.

Fig. 14B.

Fig. 15. Before operation. Fracture below surgical neck of the humerus. When exposed at operation much difficulty is experienced in replacing fragments in position to receive plate and screws.

I propose to show a few radiograms illustrating certain typical fractures and the manner in which they can be treated efficiently by plates and screws.

Fig. 5 shows a typical adduction fracture of the ankle joint. The fibular fragments have been brought into accurate apposition as they can always be by manipulation, allowing of course for damage by comminution. The tibia is broken almost vertically.

The causation of this fracture is an inward and upward thrust by the astragalus on the internal malleolus, producing a more or less vertical fracture of the tibia above the malleolus. The fibula is then exposed to a breaking strain over the sharp lower and outer margin of the tibia and it breaks transversely, the fragments being often irregular and comminuted. To treat this fracture the inner surface of the tibia and malleolus are exposed, and a sand-bag being placed beneath the external malleolus, the foot and ankle lying on the fragment of the tibia, is restored to its normal position partly by forcible abduction of the foot and partly by the thrust of some blunt-ended instrument which rests on the malleolus and which forces it downwards and outwards. The fragment having been restored to its normal position, a rigid plate with three screw holes is so placed that two screws retain the plate upon the shaft of the tibia while the lower fragment is retained in position by the pressure exerted by the lower part of the strong rigid steel plate. This is perforated by a screw to insure immobility.

Fig. 6 shows the result of the operation. It is never necessary to expose the fibular fracture in adduction fractures since the restoration of the tibia to its normal form necessitates that of the fibula allowing of course for loss of substance due to comminution.

Fig. 7 shows another adduction case operated on in the same way except that it was not necessary to put a screw in the malleolar fragment.

Fig. 8 represents the conditions present in a severe case of abduction fracture of the ankle joint commonly called Pott's fracture. I think

Fig. 16. Fracture below the surgical neck of the humerus. Condition after operative treatment with a plate and screws.

Fig. 17.

Fig. 18.

this term should be discarded since it is now carelessly used to comprise other conditions than the results of excessive abduction of the foot. The fibula is broken by torsion in the first instance, the inner malleolus is snapped off transversely by the traction exerted in it by the internal lateral ligament and the posterior and outer portion of the tibial facet is displaced backwards partly by the thrust of the astragaloid facet and partly by the strain exerted by the inferior interosseous ligament.

Fig. 9 shows the means that have been adopted to secure the fibular and consequently the other fragments in accurate apposition. Much difficulty may be experienced in restoring the fibula to its normal form, but once that is done the surgeon may be satisfied as to the reposition of the other fragments.

Figs. 10 and 11 represent fractures of the long bones of the leg, some of which are produced by torsion and others by direct injury. The conditions are very typical and distinct and require different treatment. The long spiral of the femur sometimes presents considerable difficulty to the surgeon since the spikes of bone penetrate the muscles deeply, the axes of the fragments diverging in proportion to the extent of the overlapping. Accurate apposition may always be effected by increasing the length of the incision in the skin

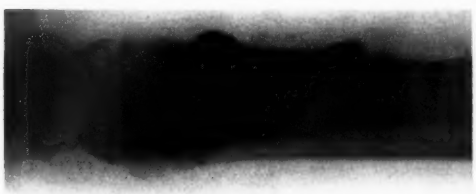


Fig. 19.

and soft parts. Occasionally in this form of fracture it is necessary to use one or more screws perforating both the proximal and distal layers of compact tissue.

In the case of fracture of the femur produced by direct injury, accurate apposition of fragments may be most readily effected by so bending the thigh as to protrude the fragments outwards through the incision. The inner margins of the fractured ends are brought in contact and while they are retained in apposition by forceps the thigh is straightened. I have endeavoured to illustrate this diagrammatically in Fig. 12.

In these cases the surgeon frequently finds that traction on the limb may not affect the overlapping of fragments in the least and that sometimes the fragment of the femur may be too fragile or comminuted to allow of forceps being applied with a force sufficient to exert the traction required. By the simple device of bringing the ends of the fragments in the manner indicated the ends may be accurately fixed without risk of damage to the bone. The arrows *A*. indicate the lines of the force exerted by forceps while the arrows *B*. represent the direction of the force exerted upon the fragments when the limb is extended.

Figs. 13A and 13B show the mode of application of the plate and screws to fractures of the olecranon. I find this method preferable to the long single screw which I employed for many years.

Perhaps the most difficult fractures to replace are those of the femur through the linear trochanter and those of the humerus through the surgical neck in children, for the reason that the bone is too fragile to be held in the grip of a strong pair of forceps and in consequence the fragments have to be handled with the greatest care and gentleness.

These fractures are illustrated by Figs. 14A and B and 15 and 16, which show the condition before and after treatment.

GUNSHOT WOUNDS OF THE ABDOMEN

A Report of Nine Cases — Seven Penetrating Wounds of the Viscera, and Two Non-Penetrating

By CYRUS GRAHAM, M. D., Henderson, Kentucky

NOTWITHSTANDING the well-established fact that in war "Gunshot wounds of the abdominal viscera are among the most fatal injuries that occur, and that statistics show that in every 100 wounded, who came under treatment, an average of three or four were hit in the abdomen, and of these one or two had perforated wounds (see International Text-Book of Surgery, 1900, vol. ii, page 937), still, it is only within the past ten years that these wounds have begun to receive the consideration from surgeons which they deserve; and on looking for data on this subject, I find that it is only within the past twenty years that the trend of surgical opinion has begun to veer from tacit irrational non-interference to the more cogent one of active surgical action. These wounds were, as a rule, considered fatal, when they penetrated the viscera, and the subject was dismissed with a few remarks as to the medical treatment.

If the patient recovered, it was due to "his wonderful vitality," or as some would have it, "a dispensation of Divine Providence."

When a foreign substance penetrates the muscular walls of the abdominal cavity, it usually inflicts a very serious injury; even when it does not enter any of the important or large viscera it may cause a violent inflammation of the peritoneum.

Fatal results have often ensued by a simple contusion of this important structure, and gunshot lesions of this membrane or of the intestines almost invariably prove fatal, unless operated upon as soon as possible — death

being caused by shock, by hemorrhage, or by a diffuse peritonitis, which usually supervenes within a few hours.

In the Civil War 87.72 per cent of the penetrating gunshot wounds of the abdomen proved fatal. I have not the statistics to hand of the Cuban campaign, but I remember that there was a small decrease in the death rate. This was owing to the use of modern small arms, with missiles of high velocity; but the International Text-Book of Surgery, vol. ii, Year 1900, states that, "Experience with the new bullet seems to indicate that the mortality from these wounds will be but little less in the future than it has been in the past. It perforates the abdomen, by a direct shot in a straight line at all but the extreme ranges, and the course indicates that the structures are probably involved."

Dr. R. H. C. Rhea, of Morganfield, Kentucky, claims that the modern small-arm projectile up to 400 yards has a rotary or zigzag motion; this motion gradually grows steady, and from 1,000 yards up to 1,500 yards and more the bullet goes direct, without a waver, and beyond this distance the ball again begins to waver until it strikes or falls. This, he claims, has a great deal to do with the nature of the wounds. As a result of gunshot injury to the abdomen there may follow (1) contusion; (2) parietal lesion; and (3) penetration of the cavity with or without wounding the viscera.

Out of seventeen cases of gunshot wounds of the abdomen, which have come under my observation, during the past ten years, nine are dead.

Nine of the seventeen I operated on and five of the nine are alive. One of the five which recovered proved to be non-penetrating, and one of the nine operated upon was a man of about 68 years of age — was on a spree when shot, and when operated upon the bullet was found lodged in the omentum. The patient died within a few days of hypostatic pneumonia. Four of the seventeen refused operation, and they are dead. The other four were operated upon by surgeons other than myself, and died.

SYMPTOMS

In describing the symptoms of this character of wounds, I can do no better than quote the words of the prince of American surgeons, Samuel D. Gross, who in 1840, laid down a line of concomitant symptoms, and although more than half a century has passed away, a half century pregnant of wonderful improvements in all lines of medical and surgical endeavor, they have been susceptible of but little improvement.

"The symptoms of a wounded bowel necessarily divide themselves into two classes, into those, namely, which are furnished by the system at large, and those which are peculiar to the parts more directly and immediately implicated. In regard to the first, they are such, generally, as denote a severe shock to the nervous system, but they are common to this and other injuries, they are of little consequence in enabling us to make out a diagnosis.

In almost all instances there is nausea, either alone or accompanied with vomiting. These symptoms often make their appearance within a few minutes after the infliction of the wound, and continue with great obstinacy for several successive days until death relieves the patient of his sufferings. The paroxysms of vomiting and evidences of pain are commonly more violent in lesions of the small intestines; but the degree of pain and the prostration of the vital powers accompanying wounds of the intestines varies remarkably in different individuals. The same is true of both hemorrhage and shock; hence these can be relied upon only when taken in conjunction with other symptoms. Reaction is often postponed for several hours after the accident, and the patient may be conscious and calm, though the subject of a most severe and critical wound; or he may be restless, trembling, alarmed, with attacks of syncope, though there be but slight, if any, danger.

The countenance, as a rule, has a pale, anxious and haggard expression; the pulse shallow, frequent and tremulous; the skin is bathed with clammy perspiration; the extremities are cold; there are griping pains in the abdomen; and occasionally involuntary discharges from the bowels, also slight delirium with indistinctness of vision.

The local symptoms are often as hard to differentiate as those of a constitutional character.

The most characteristic signs of a lesion are, unquestionably, the escape of feces, bile, food or fetid air from the external wound, the peculiar griping pains of the abdomen, and the sudden development of tympanitis.

As early as 1830, Jobert wrote that the "sudden development of tympanitis is the most valuable and positive sign of a wound of the intestines that we can have when there is no external opening, or only so small a one as not to permit the egress of gas or stercoraceous matter."

It must also be remembered in this connection that in penetrating wounds of the viscera, the bullet does not in every case enter through the abdominal wall; nor in the use of modern small arms and high explosives does tympanitis necessarily develop; for sometimes the traumatism is so small that owing to a protrusion of the mucous membrane a sort of valve is formed and this with the exudation of plastic material, which nature so bountifully supplies, affords an effectual barrier to the escape of any fecal matter, a mild local peritonitis sets up and the patient recovers. (A case is related by Haga, see International Text-Book of Surgery, 1900, page 937, in the war between China and Japan, in which the bullet entered close to the umbilicus and came out at a corresponding level by the side of the spine, and the soldier speedily recovered without any unfavorable symptoms.)

No doubt that this was due to the fact that in this war the modern fire arms with steel bullets were used, for as Seba says (see Personal Experience in Gunshot Wounds, St. Louis Medical Review, Sep., 1908), "our modern Krag-Joergensen guns with their steel bullets have been constructed along humanitarian lines, and a steel bullet with great velocity inflicts less injury than a lead ball with less speed."

DIAGNOSIS

In the diagnosis of a wounded bowel there are many other points which will occur to the mind of the surgeon, but time nor space will permit my mentioning them; nor are they always necessary, because the location of the wound, in the absence of other pathognomonics symptoms, should lead us to suspect a lesion when nausea and vomiting occur, accompanied with griping pains, great prostration and faintness, jactitation, extreme anxiety, cold perspiration and the sudden development of tympanitis.

We must also remember that in all wounds of the abdomen where perforations are even suspected, the probe is contra-indicated.

Robert Liston wrote in 1837, that "it not infrequently happens that a missile enters the abdomen, and passes out on the opposite side, directly in the course of the bowel, without in any wise interfering with them." (This fact, probably, accounts for the many reported recoveries without operations.) On theoretical grounds the possibility of such an occurrence has been denied (McGraw in the Cyclopedia Medicine, 1905, page 37, says, that "no bullet can be turned aside by the soft viscera"), but the late Hunter McGuire in an address before the A. M. Association at Richmond, Virginia, in 1881, reported four cases that had come under his observation. P. S. Conner, writing in the International Encyclopedia of Surgery, 1882, says, "that the above mentioned fact has been amply established by post-mortem."

Likewise, a bullet may seemingly, from location and nature of the wound, have gone directly through the body without even penetrating the cavity.

I here report a case of the last mentioned character for your consideration:

Case 1. Hancock, negro, aged 24, a farm laborer of large physique, was brought into my office on Sunday morning. He informed me in maudlin tones that he was "shot in the belly." From what I could learn from his companion he had gotten into a drunken brawl.

Placing him on the table and exposing the abdomen, I located the wound two inches below the umbilicus, to the left of the median line, and in the outer border of the rectus muscle. The ball seemed to have gone directly into the cavity. His circulation was 114, respiration 20, but he did not complain of much pain. I had him conveyed to the hospital, placed on the table and prepared for an operation He was in an intoxicated condition and swore that he would "not take chloroform" and for me to "jist go on and cut." I gave him a hypodermic of hyoscine, cocaine and morphine in the abdominal muscles, and had the anæsthetist have everything ready to give him the chloroform should the occasion present. He then began to vomit

profusely, and groan as if in great pain. Still many of the pathognomonic symptoms of intestinal perforations being absent, I hesitated to operate. Turning him over I noticed no evidence of the ball having passed around, and the patient being almost in a stupor, I concluded that it would be conservative surgery to operate at once.

I then made an incision down to the transversalis muscle, where all evidence of further penetration disappeared. There was considerable ecchymosis and contusion, but after careful examination with my fingers I found a small opening to the left between the transversalis and internal oblique muscles. Still in doubt as to the correctness of my diagnosis, and the patient not seeming to suffer much, I again turned him over, and after a very close examination, I found near the lumbar vertebra, a small lump, which seemed to be a foreign body. He claimed to suffer no pain on my making pressure over this region with my fingers.

Circulation had gone down to 110. I finally concluded that I could detect a slight movement of the mass. I made an incision through the lumbar muscles and found a number 32 bullet imbedded in the longissimus dorsi muscle near its insertion into the transverse process of the third lumbar vertebra.

My conclusions then were that the missile had not entered the cavity at all, but had slipped around between the muscles to a location almost opposite to the point of entrance. The patient was out in a few days, both wounds healing rapidly, but four weeks afterward he came to me, saying that he "had a boil in his side." Upon examination I found an abscess in the left side. Evacuating the contents of this I noticed that the pus came from two small sinus These were opened up on a grooved director, cleaned out and filled with gauze. This healed in a few days. This established proof that the bullet did not penetrate the cavity, and that some source of infection had lodged in the track of the wound, which upon opening and cleaning out resulted favorably.

PROGNOSIS

The prognosis of wounds of the intestines must necessarily be influenced by a variety of circumstances.

We must consider the location of the wound, the extent of the damage done, the nature of the vulnerating body and the condition of the patient's health at the time of the accident.

It is claimed that in wounds above the umbilicus, that there are probably 3 per cent which penetrate without perforating the viscera.

This fact has led many conservative surgeons, who have antagonized abdominal section in these cases to allow an operation when the wound is below the umbilicus, and taking the opposite course when the wound is above the level of this cicatrix.

The experience of modern surgery teaches us that all penetrating wounds of the abdomen should be operated upon whenever practicable, but that in wounds of the stomach, colon, or gall-bladder region the prognosis is more grave owing to the greater difficulties encountered. Some base their prognosis upon the statistics of many cases, but these statistics are often very misleading. W. L. Rodman, in Cyclopedia of Practical Medicine, 1905, claims that statistics in general show that unoperated cases give a 55 per cent mortality.

My observation inclines to the opinion that the death rate is much higher.

V. Oettingen (Berlin), see Annals of Surgery, November, 1906, page 751, states that "approximately, the mortality of abdominal gunshot wounds, with conservative treatment, will be 45 per cent on the winning side, and 55 per cent on the losing side."

As a rule, the smaller the lesion or surface involved, the less serious the shock; but often a very small lesion or the most trivial accident will turn a favorable prognosis into dire defeat: hence we should always be very guarded in giving voice to a positive opinion in these cases.

The direction of the projectile has a very significent bearing upon the prognosis. The antero-posterior being more favorable than the oblique.

Rodman says, that "in patients operated upon during the first four hours, there is but 15 per cent mortality; in four to eight hours, 44 per cent; in nine to twelve hours, 63 per cent; after twelve hours, 70 per cent."

In the Journal of the A. M. A. of November 9, 1898, the late Dr. Senn reports four laparotomies for gunshot wounds of the abdomen performed in the First Division Hospital, the only ones to his knowledge during the Cuban campaign, and all of these died; and further states that he had seen numbers of cases of penetrating wounds of the abdomen in the First and Third Division Hospitals that were on a fair way to recovery without operation.

It affords me great pleasure to quote the comment of my preceptor, the late Richard Douglas, on the report of Dr. Senn: "All of Dr. Senn's contributions — and they have been marvelously numerous — based upon his observation in the late Cuban War, have been

a source of pleasure and information to his readers. It is to be feared his conclusions will prove a serious obstacle to surgical practice, and unfortunately tend to dislodge the well-established opinion that penetrating gunshot wounds of the abdomen require immediate laparotomy."

It is unfortunate that Dr. Senn did not specify as to the nature of the wounds, location and the ultimate results. His report reads like a step backward, and how much more promising were the statements of Benj. Travers, when president of the Huntarian Society in 1827 — "with the practice of operating and stitching up a wounded gut I heartily agree, and I have found that when a wounded gut was sewn up and returned into the abdomen the sutures quickly became bridged or coated over with a thick layer of lymph, and the patient recovers with a firm cicatrix at the point to which they have been applied."

Dr. W. E. Parker, a volunteer surgeon in the late war, who has had unusually successful experience with gunshot wounds of the abdomen in private and hospital practice, while admitting that 50 per cent of the penetrating gunshot wounds of the abdomen received during the late war recovered without operation still believes in laparotomy in every case in civil life.

The late Richard Douglas, Journal A. M. A., March 18, 1899, in summing up a report of five cases operated upon, said: "I merely wish to state clearly my position in the premises. If the patient is not actually dying and the shock is not positively due to the intraperitoneal hemorrhage, immediate operation should be done." As a rule in all penetrating wounds of the abdomen resulting from gunshot injury, lesions of the hollow or solid viscera, or both, are produced, and multiple wounds of the intestines are frequent.

CASE 2. Lee Watson, male, aged 28, was shot about 8:30 P. M., October 3, 1903. I was summoned and immediately called an ambulance, and in 30 minutes had him on the operating table at the hospital.

On examination I found a small wound in the rear about an inch and a half below the superior spine of the left ilium. The course of the wound seemed to range anteriorly, and from left to right.

The patient exhibited all the symptoms of extreme shock. Circulation 140, temperature 97, abdominal muscles tense and rigid.

Patient was given a hypodermic of morphia and strychnia, and hastily prepared for an operation.

An incision was made in the median line, and on opening the peritoneum a considerable amount of blood welled up from the cavity. This was first supposed to come from the mesentery, and this important body was ligated in several places. Still there seemed to be much arterial blood pouring into the cavity; and upon closer examination I found that the bullet had passed almost obliquely across the abdomen and lodged in the folds of the transversalis muscle, piercing the deep epigastric artery on the right. The bullet, a short 32, was removed and the artery ligated with fine silk.

On lifting the small intestines several perforations became visible and the feces with grains of corn and partially digested food began to drop out of the perforations, while impudent ascari intruded themselves upon the field. Using small No. 1 catgut, I closed up eleven perforations in the small intestines, two in the sigmoid flexure of the colon, and two linear wounds in the small intestine, where the missile had torn through the gut down to the mucous coat — using Czerney-Lembert sutures in all direct perforations, and Glover's sutures in the linear wounds to prevent a possible rupture of the gut and escape of the contents of the bowels at these points.

The cavity was then carefully swabbed out with gauze, the abdominal opening closed in the usual manner and without any drainage. Operation complete at 11:30, and patient placed in bed, with circulation at 96. At six A. M. the next morning circulation was 100, temperature 97. Thirty hours after operation patient's circulation 100, temperature, 100. Thirty-three hours after the operation patient had a large stool, temperature 100, circulation 98.

Patient discharged from the hospital about last of November and has been doing a man's work ever since.

This patient was sitting down in a crouching position when shot, and reminded me of a case reported by Longmore in the Crimean War, where an autopsy showed that "sixteen openings had been made in the small intestines of a soldier by a bullet, which entered near the umbilicus and passed out near the scrotum, the man having been hit while stooping in the act of defecation."

SHOCK

Symptoms of shock, of a greater or less degree, are always present, but these symptoms frequently depend upon the idiosyncrasies of the patient. There may be only a slight peritoneal lesion with great shock, and no evidencies of shock at all with many splanchnic perforations.

As to the question of whether shock is a contradiction to laparotomy, I wish to state clearly and unequivocally that in gunshot wounds of the intestines, as a rule, it is not.

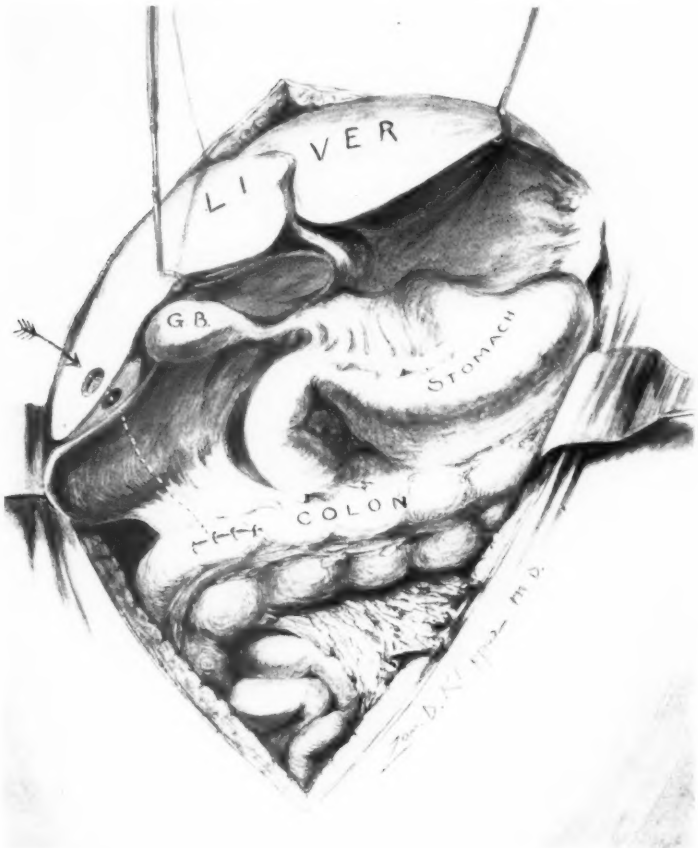


Fig. 1. Case 3. Perforation through the lower right lobe of liver spliting the margin, perforating the hepatic flexure and colon, showing by arrow its course. Colon is sutured while liver wound is not closed yet.

There is no doubt that life is often destroyed by the shock to the nervous system, before artificial stimulants to the flagging vital powers can be brought into play; but unless we have reason to believe that there is absolutely no hope, do not deblaterate, but get to work, give an intravenous or intracellular infusion of a normal salt solution, have the extremities bandaged, open the abdomen at once, catch up the bleeding points, keeping up the salt infusion, and often the patient will rally from his extreme condition, and ultimately recover.

This should be done immediately, for every moment we wait we are lessening the patient's chance of recovery.

Delay, if it does not bring death from hemorrhage, and the resulting diminution of the dynamic force of the blood current in a few hours, will bring fecal extravasation, then septic poisoning, and death from acute peritoneal inflammation.

We must bear in mind that vomiting of blood, or hemorrhagic discharges from the intestinal canal may occur from simple contusion, and a similar injury about the kidneys or along the course of the urinary tract may be followed by the appearance of blood in the urine.

Case 3. Lee Shelton, male, negro, aged 24, was shot about 11:30 A. M. He was taken to the hospital,

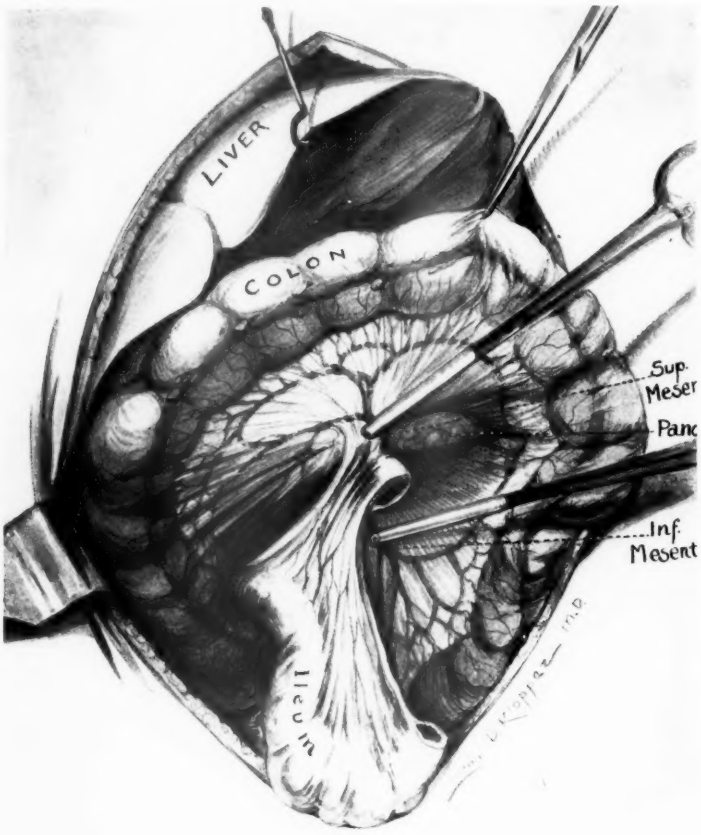


Fig. 2. Case 4. Mesentery together, note sup. mesent. artery and vein clamped. Note rubber forceps showing the area of supply of each of the arteries respectively.

and placed on the table, given a hypodermic of morphia and strychnia. Upon examination a wound was found below the ninth costal cartilage, and to the left of the midclavicular line.

The patient was vomiting, twisting and griping with pain, pulse fast and feeble, temperature 97.

Preparing for an operation as quickly as possible, I made an incision, about two inches to the right of the median line, below the costal margin, and extending down toward the crest of the ilium. On opening the cavity, I found evidence of perforation of the colon, and wound through the lower right lobe of the liver, splitting through the margin and perforating the hepatic flexure of the colon. By introducing my finger into the foramen of Winslow and compressing the gastrohepatic omentum, the hemorrhage was readily checked. The wound in the liver was then closed with very fine silk sutures, and a piece of iodoform gauze, heavily coated with iodoform powder, was compressed over this wound with a pair of long flexible dressing forceps. The two perforations in the hepatic flexure of the colon were closed with No. 1 Vanhorn & Sawtelle catgut, and returned to the cavity, which was thoroughly swabbed out with gauze. The liver was packed around with a tamponade of gauze, which was carefully twisted, and allowed to protrude out of the opening in the abdominal wall. The incision was closed up in the usual manner, except the opening for drainage.

I judged that the missile had passed up into the subphrenic space, and on turning the patient over on his left side, I found evidence of contusion to the right of the 12th dorsal vertebra, and the twelfth rib appeared to be fractured. Cutting down over this, I extracted a number 41 bullet. This wound was

dressed, and patient was placed in bed with a circulation of 120.

Patient passed blood from his bladder for four or five days. Iodoform tamponade removed on the third day, and smaller drainage inserted. Bowels moved on the third day. All drainage removed on the eighth day, though wound healed slowly. Patient recovered entirely, and is now working in Terre Haute.

It must be remembered that in private practice in small cities, even if there is a hospital, there are but few of the conveniences of the larger hospitals, and the facilities for caring for a case of emergency surgery are often meager. Often these cases fall into hands of men who, however competent they may be theoretically, have absolutely none of the experience which renders major operations successful, nor do I think that this want of experience should keep any intelligent physician from doing this work if no one of experience is near. Rather do I take the positon as declared by McGuire, "If it is urged that the means suggested are desperate, it can be said in reply that the peril is so extreme," and if he is reasonably sure of his diagnosis — to get some other physician — they are close together now, go to work and endeavor to save his patient's life by a rational operation. He may exchange an almost certain prospect of death for at least a good chance of recovery. I recognize the truth of the quotation, "that fools rush in where angels fear to tread," but as Festus said: "to be wise is to be a fool," and were there no one to venture, I fancy but few new paths would be trod. The great pioneer of American Surgery (Gross), had the proper idea on this subject when he wrote: "It is folly to think of any other practice. I have seen enough wounds of the bowels, both in men and animals, to satisfy me that enterorrhaphy is, in itself, one of the most innocent of operations." Joseph D. Bryant on the same subject writes (see Operative Surgery, 1902, vol. ii, pages 650–666), "The increasing number of favorable results in heretofore hopeless cases, following prompt, aggressive, aseptic procedure, have transferred a mere hope of success, based on last resort, to the field of established surgical action," and that "that modern methods of procedure in gunshot wounds of the abdomen result in about thirty per cent recoveries, as compared with ninety-five per cent of deaths following the old non-operative, expectant method of treatment."

CASE 4. E. Hawkins, male, white, aged 23 years, was admitted to the hospital Nov. 24, 1904, about 9 P. M. He had been shot about three hours before, the ball, a number 38, entering the abdomen 3 inches above McBurney's point and ranging obliquely through the viscera, and being found resting in a fold of peritoneum in the left side just above the sacro-iliac synchondrosis.

There was no nausea, but other symptoms of profound shock were present. The median incision always offers the best opportunity to check intestinal hemorrhage, and the abdomen should be opened enough for the surgeon to work rapidly and thoroughly.

On entering the cavity, the bleeding was found to be very extensive, and the superior mesenteric was grasped near the beginning of the jejunum, with a pair of long forceps, whose blades had been covered with two pieces of rubber tubing to prevent the bruising of the vessel. This fold of mesentery or peritoneum contains the superior mesenteric artery and veins, and compression at this point will completely control the blood supply of the ascending colon, transverse colon through the colic arteries, and all of the small intestines, except the duodenum.

Ordinarily any considerable hemorrhage will have ceased before the opportunity for operation presents, either by the efforts of nature, or the death of the patient, but if there be any reason to believe that rapid and dangerous hemorrhage still continues, the prompt following of the above method should occur at once; if there is but little evidence of bleeding, we should commence at once the search and closing of all intestinal perforations.

The bleeding points may be ligated as we proceed with the work.

After sponging off the omentum, the edges of the different wounds were everted and closed with silk, also removing a portion of omentum where it was greatly damaged, and ligated above the seat of injury, and evacuating the extravasated blood in the mesentery, sponging off and closing up the wounds.

Closing up the perforations with various forms of sutures as rapidly as possible, I counted in all 39 perforations.

One long linear cut in the ascending colon was closed with Dupuytren's suture, and the rest were mostly closed with Lembert sutures, using fine catgut in all. Some of the repairs were made by a decided elbowing or the turning of the gut. In some cases the lumen of the gut was dangerously narrowed, but altogether the perforations did not seem bad as in case 2, but the mesenteric folds were in a more serious condition and the hemorrhage more excessive.

Going over the intestines carefully inch by inch until I was thoroughly satisfied that I had closed all of the perforations, and then making an examination of the rear wall, found the bullet as stated above. I then released my forceps on the superior mesenteric artery, carefully swabbed off the mesentery, ligated

a few more bleeding points, thoroughly sponged off the intestines, and cleansed out the cavity, then washed out the cavity with a hot decinormal salt solution, closed up the abdomen in the usual manner and without drainage. Patient came off the table, and placed in bed; circulation 114, respiration very slow and labored. Time of operation one hour and twenty minutes. At 6 A. M. the next morning patient's circulation 110, temperature 100, respiration 24 — patient had to be catherterized.

Bowels moved voluntarially on the morning of the third day, and patient died of septic peritonitis that night. Normal salt infusion and other means were used, but with no avail.

This was the most tedious and unsatisfactory operation I had ever undertaken. This patient had been a hard drinker, and was very probably under the influence of strong drink when he was shot. He was also suffering with lues in the third stage, and when I would attempt to close a perforation my sutures would tear through the muscular coating of the gut, and I found that the utmost care was necessary to make them hold at all. Taking this into consideration with the laceration of the omentum and the peritoneum, the result was to have been expected.

The amount of injury which has been done, and the condition of the patient at the time of injury are both factors to be considered, as well as certain septic or aseptic conditions in which you may have to work. We often read the statement that gunshot wounds of the abdomen are more fatal in actual warfare than in civil life. I doubt this statement. As a rule when the physician or surgeon is called to treat a gunshot wound of the abdomen, the usual case is that the patient is a negro, who has been on a drunk, his system is surcharged with mean whiskey, his intestinal tract is loaded with cheese, snaps, fish or chitlings; or it is a white man who winds up a drunken orgy, or game of chance with a shooting scrape, and as a rule his system is in about the same condition, and his vitality is put to a test not only to throw off the toxines, the elimination of which has been inhibited; but in addition to this stand the shock of the wound and the loss of blood.

CASE 5. Tom Clark, negro, male, aged 20 years, shot while at a negro festival, and fearing arrest, lay out in the weeds several hours. When found was still able to walk, but was very weak. He was taken to the hospital, and on examination was found to be suffering with two wounds, one a flesh wound in the right shoulder, the other, in the rear, about one inch below the border of the 12th rib, two inches to the left of the spine, and from appearances ranging downward.

His circulation 124, temperature 99⅘, respiration 30, suffering great pain and groaning and praying with every breath.

Gave him a hypo. of morphia, grains ¼, strychnia grains $\frac{1}{30}$, and placed on the table for an operation.

Turning him over on his right side, an incision was made over the course of the bullet, and it was found to have penetrated the cavity. This wound was then packed with iodoform gauze, and covered with surgeons plaster.

The patient was then placed on his back, and incision made in the median line. There was no evidence of any great amount of hemorrhage, but the first loop of small intestines picked up disclosed two perforations. Each perforation was closed with Lembert sutures of fine catgut, and all blood clots and fecal extravasation carefully wiped off. Seven perforations were found, all in the jejunum and ileum, all very small, and I judged they were made by a small No. 22 bullet. This could not be located. The abdomen was thoroughly flushed out with hot saline solution, particular care being given to get out all of the clots, and also clean the posterior wall at the point of entrance, and then the viscera and parieties were carefully sponged so as to remove all possible cause of infection that we could, and the peritoneum was closed with interrupted sutures, the fascia and muscles with through and through silkworm gut. Patient was placed in bed and two hours after operation, circulation was 114, respiration 20, and resting quietly.

Four hours after this circulation went up to 130, respiration 25, temperature 102. Ordered saline infusion, and strychnia and whiskey hypodermically, circulation went down, and patient voided his urine voluntarily. Had fairly good night, but at 6 A. M. temperature 103, pulse weak and rapid. Patient died of septic peritonitis on the third night after operation.

Post mortem showed that the perforations were almost healed, and covered with plastic lymph, which nature provides in a bountiful manner. Bowels were very much distended, full of feces and gas. Peritoneum highly inflamed.

If I had this operation to do over again, I would follow the suggestion of Dr. Douglas in the Journal of the A. M. A. for March, 1899, and have injected into the patient's bowels a few ounces of a saturated solution of sulphate of magnesia, but I was not acquainted with this method of procedure at that time.

There not being very much hemorrhage, and the small openings made by the missile made me very hopeful of his recovery, notwithstanding the fact that he had been on a carouse, and had lain out on the ground for several hours.

CASE 6. Chas. Haynes, white, aged 19, was shot in the left umbilical region about three inches to the left of the median line.

I was called about 8.30 P. M. to a private residence where I found the patient lying on the bed, clothes off, and a wad of rags piled upon his abdomen. He was shot in a boyish quarrel, and the father of the boy who did the shooting was present.

The patient's appearance and symptoms suggested intestinal perforation, and I at once asked to have him conveyed to the hospital, but the parents said that if there was any operation to be done that I "must do it at home." All present seemed anxious to keep the matter as quiet as possible; so I sent for another physician and nurse, and on their arrival placed the boy on the dining-room table and prepared for an operation as quickly and thoroughly as the surroundings would permit.

In the meantime I had informed the family of the gravity of the situation, and of the responsibility which they were placing upon me and on themselves in operating under those conditions.

Giving the patient a hypodermic of strychnia, grs. $\frac{1}{20}$, with morphia, grs. $\frac{1}{4}$, I had Dr. V— to give the ether (making my first case under ether — had no chloroform with me).

I made my incision directly over the point of entrance, through the external and internal oblique muscles, but when I reached the transversalis muscle I found a piece of cloth, and there was a deflection of the missile, but I could trace it by the contusion for an inch to the left, where upon close examination it was decided that the abdomen was penetrated.

Upon opening the peritoneum, a wound was found in the omentum, and drawing this curtain to one side, a wound was found in the jejunum, through which there escaped a mass of fecal matter. The hemorrhage was not profuse and as soon as a wound was discovered it was closed by suture. I found some bleeding from a branch of the superior mesenteric, this was ligated with fine silk. Three more perforations were found, all in the small intestines, and were closed in the usual manner with fine catgut. While searching for other perforations, sponged off all clots and extravasation of fecal matter, and raising the intestines so as to cleanse the posterior wall, the bullet, a number 32, was found buried in the muscles of the back. This was removed by a pair of dressing forceps, and the small wound in the muscle where it was resting was filled with iodoform powder. Everything was sponged off carefully and the peritoneum was closed with continuous catgut sutures. Each layer of muscle was closed separately, the wound thoroughly cleansed, and then finally closed with silkworm gut.

Patient came off the table with pulse 140, temperature 98, respiration 26. Rallied, and at four in the morning when I left him was resting easy. The fourth day gave simple enemata without results. Then gave enamate of milk and molasses, one pint each, as recommended by Dr. E. J. Senn (see Annals of Surgery, April, 1905, page 639), resulted in good bowel movement. He presented an uneventful recovery, and I can truthfully say was the most satisfactory case I ever operated on.

Satisfactory first, because of the result; second, because I received a more remunerative fee than for any surgery I had ever done.

The young man who did the shooting now lives in Idaho, is married, and a good citizen without the stain of murder over his name.

CASE 7. Mrs. S —, female, white, married, aged 16, was shot by a jealous husband early in the morning of March 1, 1906. Was carried to her residence several hundred yards away; and when I arrived I found her circulation 120, temperature 97, respiration 30, and very weak. Not suffering much pain but presenting symptoms of profound shock. I discovered a wound in the lower angle of the left hypochondrium, from which there was considerable hemorrhage.

Covering this with a temporary dressing, and giving a hypodermic of $\frac{1}{20}$ grain of strychnia, had her conveyed to the hospital and prepared for an operation. Placing her on the table, I found that her lower extremities were paralyzed. On again examining the wound, I found that it was anterior to the midclavicular line, and over the region of the splenic flexture of the colon.

An exploratory incision was made over the wound, and on penetrating the cavity found evidence of considerable hemorrhage. This incision was then closed with a temporary dressing, and a large incision was made in the semilunar line from the margin of the ribs to a point opposite the umbilicus (Langenbuchs). Upon opening the peritoneal cavity, and pushing the mesentery aside, I found clotted blood and a continuous hemorrhage, which, on examination proved to come from a vein near the attachment of the phrenocolic ligament to the spleen, either a branch of the superior mesenteric or of the splenic. There was also a small linear cut in the splenic flexture of the colon, reaching only through the muscular coat. This was closed over with fine catgut. There was considerable ecchymosis along the anterior border of the spleen, but no penetration. Extreme care was used in handling the spleen on account of the danger of tearing the capsule, and also from the intimate relation it bears to the solar plexus of nerves, there is always a high degree of shock even from handling this organ. There was also a slight hemorrhage from the diaphragm. Satisfied that the ball was lodged near or between the spinal vertebræ, and the patient becoming very weak, further effort to find the ball was desisted from and all hemorrhage having ceased, the surrounding parts were sponged off thoroughly, a small cigarette drain was placed in the wound of entrance, and the abdominal incision was closed in the usual manner. The patient was placed in bed, and given one pint of saline solution intravenously. Rallied, and at 12 P. M. was resting easy, pulse 110, temperature 99, respiration 20. Rested fairly well until the afternoon, grew restless, and circulation ran higher. Ordered saline enema, followed with nutrient enemata. Bowels moved, but retained the

nutrient enemate, patient conscious. Bladder emptied voluntarily, the next afternoon the patient aborted, fœtus about four months. Died that evening at ten o'clock. On post mortem found the bullet on the right of the spinal column, having passed through between the laminæ of the 9th and 10th dorsal vertebræ, bruising the cord.

Had this case been where we could have had access to an X-ray I would have proceeded in a different manner, and given the patient a better show for her life.

CASE 8. H. H., male, white, aged 45, foreman in mill, was out in the country about six miles from town attending a barbecue, in which, beer, kraut, vegetables and barbecued meats were very much in evidence. Starting home was sitting down on the floor of the wagon, a young man was standing over him with a sawed-off rifle in his hands. The horses started suddenly, the young man trying to keep his equilibrium, pointed the gun down and pulled the trigger, shooting the older man in the abdomen.

The patient was lifted into a buggy, further loaded with whiskey to stimulate him and brought to the hospital, arriving about six in the evening. Was placed on a table, suffering great pain, almost unconscious, and holding himself in a position of opisthotonos. He was given a hypodermic of strychnia $\frac{1}{30}$, with 2 tablets of hyoscine, morphine, and cactin compound, and made as comfortable as possible. Upon examination a wound was found about three inches above and to the right of the umbilicus (Robson's point), and a diagnosis was made of the intestinal perforation. His wife, who was several miles in the country, was sent for, and the patient was prepared for an operation. She arrived about 9:30 P. M. and gave her consent to the operation.

The patient took the anesthetic very badly, and was at least thirty minutes coming under the influence of the ether (I have always found ether unsatisfactory in this character of wounds).

The incision was made in the outer border of the right rectus, about seven inches long. Pushing aside the omentum which was wounded, a perforation was found in the transverse colon this was temporarily closed with a Murphy clamp as was the wound of exit two inches farther down the gut. There being considerable hemorrhage from a branch of the superior mesenteric, a clamp with rubber tubing over the blades was placed subperitoneally so as to control the arterial supply of the splanchnic area, thus effectually holding back all hemorrhage from the coelic axis and mesenteric arteries. (See Crile on Control of the Splanchnic Shock, page 131 of Cartwright's prize Essay, 1899.)

Five perforations were found which were closed with No. 1 catgut, the bowels being held up and covered with hot towels.

Before returning the small intestines into the cavity, the forceps were loosened at the duodeno-jejunal flexure, where the fold of peritoneum forms the suspensory ligament, which suspends the small intestines from the posterior abdominal wall. The removal of the clamp released whatever bleeding points that escaped observation. These were ligated, and the wounds in the mesentery closed, the wound in the omentum quilted around with Pagenstacker thread, the cavity thoroughly sponged out with gauze, the peritoneum closed with continuous catgut sutures, the muscles brought together, and closed with twenty-day catgut interrupted sutures and then the through and through sutures of silkworm gut.

Patient came off the table with circulation 114, temperature 97, respiration 26.

At 6 A. M. the next day temperature 98⅕, circulation and respiration normal. Bladder emptied naturally, bowels moved on the fourth day. About the eighth day the patient had a rise of temperature, and on examination, a submural abscess was found, which on opening discharged quite an amount of pus. Wound was then dressed carefully every morning, recovery rapid and complete. Patient returned to work six weeks after operation.

CASE 1 was reported just to show that the conditions and symptoms are often so misleading that it is almost impossible to make a diagnosis, without the use of the knife.

I have taken these cases up separately, and while reporting the salient features of each case, have traced the evolution of surgical action from the days of Benjamin Travers, (1827) down to the present.

In reading of their work, their courage, and their success, one can but admire them for their conservatism, as well as for the song of hope which continually sang an iliad in the darkest hour.

The technic in all of these operations was based in the main on the principles of general surgery. Chloroform was the preferred anesthetic.

CASE 2 was a remarkable case, on account of the number of perforations, the amount of extravasation, the amount of injury done compelling me to do work which almost amounted to enterectomy.

Case 3 was a very interesting case, and showed the vagaries of a bullet, in missing the kidney, and being one of two cases in which I placed drainage.

Case 4 was hopeless from the start, but in doing the work I did it with the feeling that there is no end to human endeavor.

Case 5 shows the danger of delay and the almost inevitable result of fecal extravasation.

Case 6 exhibited nothing unusual from a clinical standpoint.

Case 7 shows the want of expert knowledge, and the modern appliances of diagnosis; but also tends to prove that the surgeon should be prepared not only to suture a wound of the intestines, but to treat any of the associated injuries.

Case 8 was simply a successful case, well handled, and proves that experience is the thing.

I relied upon dry sponging almost exclusively, and favor it above all methods. Still in some cases washing out with hot salt solution is good surgery. Great care should always be given in every instance to avoid handling the viscera too much, and while the coils of the intestines are being handled they should be protected as much as possible by hot sponges or pads.

I do not think much of drainage, but am of the opinion that the peritoneum is wonderfully able to take care of small clots or other matter that may be overlooked.

SUTURES USED

Van Horn suture material was used almost exclusively, and some of this material had been on hand for five years.

For the first twenty-four hours water; the next eight days broth, fruit juices and a little milk, after that nourishing diet.

RULE

Get there; cleanliness; operate; close up all perforations; put in bed and let alone.

THE TREATMENT OF INFECTED AND COMPLICATED CASES OF LABOR BY ABDOMINAL SECTION[1]

With the Report of Ten Cases

By EDWARD P. DAVIS, M. D., Philadelphia

PHYSICIANS are occasionally called to cases of labor complicated by disproportion between mother and child, which through neglect or bad treatment have become infected and sustained considerable laceration in addition. In these cases the child is dying or dead, and the indication is to deliver the mother, saving her life if possible.

The first procedure which these suggest is embryotomy, with its advantages of avoiding abdominal section and leaving the patient in possession of the uterus, tubes, and ovaries. Should recovery occur she may subsequently bear children.

Where the birth canal has been so badly lacerated that the injuries extend into or near the peritoneal cavity and are accompanied by severe bleeding, the physician may try to control the condition by closing such lacerations through the vagina, or tamponing the rent with iodoform gauze.

The intravaginal treatment of these cases is successful in a certain number. Where the disproportion between mother and child is slight and where laceration has not opened the peritoneal cavity, embryotomy offers a favorable prognosis. Where, however, disproportion is marked, the mother seriously injured and infected, we believe that delivery by abdominal section, followed by the Porro operation, will give the best results.

Experience has shown that it is of especial importance that the body of the uterus be removed and that the stump be treated outside the peritoneum. If the operator has especial skill in the removal of the uterus, he may choose this rather than the Porro operation, but in many cases the danger of hæmorrhage and wounds of the ureters is greater in the entire removal of the uterus than in the Porro operation.

We have had occasion to deal with ten cases, infected at the time of labor, by abdominal

[1] Read before the Obstetrical Society of Philadelphia, January 7, 1909.

section. In six of these the Porro operation was performed; and in one the uterus, tubes, and ovaries were removed more than a year after the delivery by abdominal section. Of these ten cases, seven have lived and three have died. In five cases the child survived. Among these were five especially desperate cases, in which efforts to deliver had been made by forceps, version, and craniotomy, in which serious laceration had been inflicted, and the patient brought to the Maternity in a condition of shock. These women were treated by the Porro operation and all of them recovered.

These cases in detail are as follows:

Case 1. Negro primipara. Highly contracted pelvis. History of obstinate constipation and taking of irritant purgative medicines during pregnancy. No history of pre-existing infection of the genital tract. Child delivered by celiohysterectomy, with intraperitoneal treatment of the stump. Mother died with abdominal lympangitis. Post-mortem examination, multiple ulcers of the intestine, mixed infection of the abdominal lymphatics and peritoneum. Stump of the uterus aseptic and healed. The child survived.

Case 2. White primipara. Highly contracted pelvis. Delivery had been attempted by forceps by two physicians. Patient brought to the Philadelphia Hospital infected and exhausted from shock and hæmorrhage. Pelvic contraction forbade embryotomy. Delivered by celiohysterectomy, with intraperitoneal treatment of the stump. Died of septic peritonitis.

Case 3. Negro primipara. Rachitic and highly contracted pelvis. Labor failing, patient was delivered by celiohyster tomy. Beyond some tendency to uterine relaxation and hæmorrhage, which was controlled, operation proceeded smoothly. Mother died on the fifth day. Child survived. Post-mortem, pleurisy, acute dilatation of the stomach and intestines, peritonitis. Uterine and abdominal wounds, healing, clean, aseptic.

Two of these cases illustrate the fact that a pregnant patient may have infection of some other portion of the body than the genital tract at the time of labor, and die after delivery. In cases 1 and 3 the fact that the uterine wounds were clean, aseptic, and healing, shows that death did not result from infection of the genital tract. In one a pre-existing intestinal infection, and in the other pleurisy extending to the peritoneum, caused death. In case 2, peritonitis followed dropping the stump of an infected uterus. Here we must believe that this patient's chance would have been better had this stump been treated outside the peritoneal cavity.

Case 4. White primapara. Justo minor pelvis; internal conjugate 8 cm. Had been in labor several days without engagement of the head. An effort had been made by the attending physician to secure engagement and delivery by forceps. On admission to the Maternity the head was freely mobile, above the pelvic brim. Celiohysterotomy was performed. The mother reacted well after delivery. One of the buried uterine stitches became infected, probably from the endometrium, and the infection followed the line of the stitch to the skin wound. A sinus developed, which persisted, although the stitch was discharged. This infection also spread into the surrounding pelvic tissues, and an abdominal abscess resulted, which was opened through the abdominal wall by Dr. Montgomery. Subsequently he removed the body of the uterus with the tubes and ovaries, which had become infected. The child survived in good condition. In this case long continued labor and efforts at delivery by forceps resulted in infection of the endometrium. After celiohysterotomy this infection gradually spread to the surrounding tissues, along the track of a stitch to the abdominal surface. In this case the safer procedure at the time of delivery would have been the removal of the uterine body and the extraperitoneal treatment of the stump. The patient ultimately made a good recovery.

Case 5. Multipara. Obliquely contracted and rachitic pelvis. Had one twin pregnancy from which the children survived. Six other pregnancies had terminated in the loss of the child. In one of them craniotomy was performed. This patient had three applications of the forceps, and attempted version, before admission to the Maternity. She had been considerably lacerated and was in shock and exhaustion upon admission. The cervix was bruised and lacerated. The birth canal greatly swollen. The head of the child tranversely at the pelvic brim. An effort was made to deliver by craniotomy, but this failed. The Porro operation was then performed and a mutilated child delivered. This patient made a tedious recovery, complicated by sloughing of the internal surface of the stump. She finally left the Maternity in good condition.

Case 6. White multipara. Had lost one child from difficult breech labor. Pelvis flat, rachitic. Before admission to the Maternity had forceps applied twice. After admission an effort was made to deliver by craniotomy. This effort failed. The Porro operation was performed, and a mutilated child delivered. This patient made a good recovery. She has been seen several times since the operation, and once sought advice for nervous symptoms following the menopause. She has had to work very hard, and complained of a small ventral hernia, for which she declined operation.

Case 7. White prim para. Justo minor p lvis of moderate contraction. She had been in labor four days, during which her attending physician had ruptured the membranes, applied forceps, attempted version, and performed craniotomy. She had suffered considerably from shock and hæmorrhage, and had been several times anæsthetized. She was then placed upon a cot and brought on a railway train seventeen miles

to the Maternity. On examination the patient was pale and exhausted, but remarkably courageous. The cervical and vaginal tissues were so swollen and lacerated that the relation of the parts could not be ascertained. The patient was delivered by the Porro operation. On opening the uterus its internal surface was greenish yellow and the odor so foul as to cause nausea in those present. The child's head had been crushed and one of the parietal bones torn away in the effort to deliver. The patient made a good recovery, and has since reported at the Maternity in good condition.

CASE 8. White multipara. Had given birth to two still-born children, and four living children with exceedingly difficult births. Justo minor pelvis; internal antero-posterior diameter 7½ cm. Was seen in consultation with a physician, the patient having been in labor twenty-four hours. The head had not engaged but remained freely movable above the pelvic brim. The physician had tried twice to apply Tarnier's forceps and make traction. In the first attempt the forceps slipped, and in the second, free hæmorrhage followed the introduction of one of the blades. This was so alarming that he desisted, packed the vagina, and summoned consultation.

I found the patient considerably shocked and blanched, with rapid, feeble pulse. The fœtal heart sounds were fairly good. The head was freely movable above the pelvic brim, and the patient was complaining of indefinite pain and air hunger. There was not much hæmorrhage from the vagina, as it was tightly packed with cotton. The patient was in unfavorable surroundings where it would have been impossible to carry out aseptic precautions.

She was immediately brought by ambulance to the Jefferson Maternity, and the Porro operation selected for the following reasons:

As the child's heart sounds, when the patient was first seen, were still fairly good, it was determined to give the child whatever chance might still remain. The attempts already made at delivery, and the patient's unfavorable surroundings, made it practically certain that she was infected. The alarming hæmorrhage after the attempt to introduce the forceps blade pointed to a serious laceration of the pelvic or abdominal tissues. It was believed that the situation could be controlled most efficiently by abdominal section followed by the removal of the body of the uterus. This was accordingly performed. The child was dead, showing no signs of life after delivery. Before completing the operation a careful examination was made from above for injuries to the cervix and vagina. On the left side of the pelvis a rent was found in the posterior vaginal fornix, through which four fingers were easily introduced, from above downward into the vagina. Oozing bright hæmorrhage was still going on from this rent. With considerable difficulty this was closed from above by a continuous suture of chromicized catgut. The Porro operation was completed in the usual manner, and the patient given transfusion and stimulation. She made an uninterrupted but tedious recovery, and has since reported in fair condition. In my experience this is the only case that I have seen recover after a laceration of the genital tract, extending into the pelvic and abdominal cavity.

CASE 9. Multipara. Had lost children by difficult labor, and physician had attempted with great force to deliver child by forceps. On admission, a parietal bone was presenting, the pelvis was considerably contracted, the head was mobile at the pelvic brim, and the genital tract so bruised and swollen, that accurate internal measurement of the pelvis could not be made. The child's heart sounds could still be heard. As efforts at delivery had been made in a tenement without antiseptic precautions, the patient was considered infected, and delivered by the Porro operation. The child's cranium was so bruised and compressed that its recovery seemed most doubtful. One eye was severely bruised and bloodshot. The mother made an uninterrupted recovery, and the child gradually became able to nurse and did well. It manifested a peculiar spasmodic cry, as if in pain, and over the vertex a diffuse, bony thickening persisted.

CASE 10. Multipara, having lost children in previous difficult labors; presentation of he posterior parietal bone; fruitless efforts at forceps delivery by a physician known to be dirty in his operative treatment; the patient in a dirty tenement. Heart sounds of the child fairly good. Delivery by the Porro operation, placenta under the line of incision. Forceps had been applied over the child's occiput and face, and the face was severely bruised. For some time the child could not nurse, and was fed with a pipette. Mother and child ultimately recovered, the mother nursing her child.

In speaking of the Porro operation we refer to the operation as designed and practiced by Porro. This consists in the extraperitoneal treatment of the stump, which is fastened to the lower end of the abdominal incision, the greater part of it subsequently separating by sloughing. It is a mistake to speak of the Porro operation when hysterectomy is performed, the stump covered with peritoneum and dropped. Porro did not design or practice this form of hysterectomy.

From the standpoint of surgery the Porro operation is unsatisfactory; it leaves a considerable mass to separate by sloughing, and exposes the patient to the inconvenience and delay of this process. Its results, however, in the class of cases described, we think justify its performance. It may be quickly done and patients escape general infection in cases which do badly when treated by other methods. The condition seems one in which we must sacrifice theoretical considerations for the practical good of the patient.

The final result of the operation in these cases has been satisfactory. The pelvis has been left free from exudate. The stump of the cervix is reduced to a very small mass of tissue, which closes the vagina, and the vagina and pelvic fascias are drawn upward and firmly fastened to the connective tissue about the stump. The fact that the patient is subjected to the inconvenience of the menopause cannot be charged to the form of operation employed.

In contrast with the results obtained by the Porro operation in these infected and difficult cases, we recall the death of patients after other methods of treatment. We have not yet succeeded by other methods in saving the life of a patient who had become infected in labor and had sustained severe lacerations opening the pelvic and abdominal tissues. In the cases which proceeded fatally we endeavored to control the condition by delivery through the vagina, by tamponing and draining the uterus and the rent in the pelvic tissues with iodoform gauze. The results, however, were not successful. It is, furthermore, impossible to secure accurate closure of these lacerations from below, because the tissues are so bruised and swollen that good approximation cannot be obtained.

The objection may be urged that the Porro operation leaves the woman incapable of further childbearing. This is admitted, but are these cases such that the woman should be exposed to further danger in the effort to bear children? Is not the saving of her own life as much as can be expected or hoped for under the circumstances?

These cases further suggest the observation, already trite, that the lives and health of patients will be better preserved if general practitioners do not, when the head of the child does not engage, attempt to apply forceps.

We may further remark that repeated efforts at forceps or version, unless expertly made and under perfect asepsis, must result in infection. We regard patients subjected to such attempts at delivery, as infected.

CHROMOCYSTOSCOPY IN FUNCTIONAL RENAL DIAGNOSIS BASED UPON THE EMPLOYMENT OF INDIGOCARMIN[1]

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SINCE the publication of the experiences of Völcker and Joseph in 1903 concerning the diagnostical value of indigocarmin in kidney diseases, there has been a revival in the interest and importance attached to chromocystoscopy, particularly with reference to the diagnosis of surgically diseased kidneys. Prior to that time the use of methylene blue, rose anilin, potassium iodid, etc., by Bouchard (1, 2), Achard (3, 5), Castaigne (3, 4, 5), Albarran (6), Bernard (6), Lépine, Lyon and others, had been extensively advocated, some drawing their conclusions after noting the first appearance of the coloring matter from the ureteral orifices, and others laying stress upon the intensity and duration of the color reaction during the period of elimination.

The value of judgment of the sufficiency or insufficiency of one or both kidneys based upon the permeability of the same to the various anilin coloring matters was seriously questioned by a number of urological authorities, notably Casper (7) and Israel (8), and accordingly chromocystoscopy, so far as renal diagnosis was concerned, fell into disrepute. The chief objections to methylene blue and allied substances, were their occasional elimination as colorless chromogen and inconstancy of color reaction.

Heidenhain (9), Arnold (10), and Chrzonszczewsky (11), experimenting with indigo-

[1] Read before the Pennsylvania State Medical Society Meeting held at Cambridge Springs, September 14-17, 1908.

carmin, have conclusively proven that it is eliminated from the body tissues through the kidneys following injections constantly as blue coloring matter, and the first in particular has demonstrated that the anilin color substance is execreted from the epithelium of the renal tubules, while from the glomeruli a colorless secretion takes place. Important strides in functional renal diagnosis were therefore immediately seen in the horizon of this new field, in support of which, during the past five years a flood if literature (Blumreich (12), Bier (13), Fueth (14), Hofmeier (15), Joseph (16), Karo (17), Kapsamer (18), Kümmell (19), Keydel (20), Kakels (21), Rosemann (22), Riese (23), Rauscher (24), Sellheim (25), Suter (26), Thelen (27), Vogel (28), and Zangemeister (29) attests.

Valuable as may be the use of indigocarmin in functional kidney diagnosis, especially in surgical conditions, chromocystoscopy enjoys a most important sphere in several other respects, namely, demonstration of the ureteral orifices in difficult catheterizations, ease of determination of the number and location of the ureteral orifices in anomalous cases of a single kidney and ureter or bilateral multiple atypical ureters, occlusion of the ureter by stricture, calculus, inspissated pus from pyonephrosis, pyelonephritis or abscess, and by pressure of various abdominal tumors, and finally the differential diagnosis of neurasthenia or hysteria from organic lesions, by studying ureteral peristalsis in conjunction with the frequency of the dicharged jets of blue-colored urine from the ureteral orifices. A consideration of these important facts lies without the scope of this paper and will be reserved for future communications.

Assuredly, this article is not a plea for the substitution of chromocystoscopy for functional renal diagnosis based upon the bilateral synchronous catheterization of both ureters, but in conjunction with this to facilitate diagnosis where it may be difficult or impossible to determine or where for any reason there is not the opportunity or time to catheterize both ureters and make a comparative determination of the lowering of the freezing points of the urines, the amounts of urea, the artificial glycosuria following phloridzin injection, etc. Indeed, not infrequently when a general anæsthetic is necessary to conduct the cystoscopic examination, it lies easily within the bounds of possibility to follow chromocystoscopy by nephrotomy or nephrectomy during the same anæsthetization. In short, from a limited experience, but sufficient in view of the following cases, I believe the value of chromocytoscopy based upon the employment of indigocarmin has been and is substantially underestimated.

From 1900 to 1906 the mortality at the University Hospital due to insufficiency of the second kidney following nephrotomies and nephrectomies was 16.6 per cent. Since the employment of the newer diagnostical methods, essentially chromocystoscopy, the past two years, where there has been an opportunity to carry out the indigocarmin test, thus far there has not occurred a single death from this cause. Personally, therefore, I consider it a crime to undertake a kidney operation, unless the functional sufficiency of the sister organ is determined.

The technique of chromocystoscopy is very simple, and in not more than 5 to 10 per cent of the cases examined was general anæsthesia necessary. The usual steps in a simple cystoscopic examination were followed and 4 cc. of a 4 per cent solution of indogocarmin were injected intramuscularly into the lumbar or gluteal region.[1] The cystoscope was then introduced and, in the case of normal kidneys, from 7 to 20 minutes after its injection the indigocarmin was seen simultaneously on both sides, coloring the jets of urine a dark blue as they were ejected from the ureteral orifices into the colorless fluid content of the bladder. The excretion of the coloring matter proceeded for several hours. It is advisable to prohibit the patient from taking any fluid for 12 hours prior to the examination and the diagnosis will depend upon observations, not only of onset, intensity, and duration of the anilin color elimination, but also upon the frequency

[1] I am aware of the fact that some authors recommend as much as 20 cc. of a 0.4 per cent solution, but I have not found it necessary to use the comparatively large quantity of solution, preferring a smaller amount of a more concentrated solution. It is not impossible to expect that one or the other of these amounts may furnish the more desirable and reliable results, or they may prove to be equal in efficiency. At any rate my experience thus far does not warrant conclusions. Suffice it to say that from neither amount have I ever noticed any complication or undesirable sequel.

TABLE OF CASES.

No.	Name	Age	Diagnosis	Time of elimination in minutes following the intramuscular injection of indigocarmin 4 cc. of 4 per cent solution.		Treatment
			FUNCTIONALLY NORMAL KIDNEYS	RIGHT KIDNEY	LEFT KIDNEY	
1.	T., William	35.	Nephralgia.	12 dark blue.	8 dark blue.	Uric acid solvents.
2.	M., William K.	22.	Acute catarrhal cystitis.	8 " "	10 " "	Urinary antiseptics.
3.	McM., Patrick J.	50.	Chronic cystitis; contracted bladder with diverticulum.	20 " "	20 " "	Rest; diluents; irrigation.
4.	K., Alvin	44.	Very small external urinary meatus.	24 " "	14 " "	Meatotomy.
5.	H., Joseph T.	43.	Chronic cystitis; perineal fistula.	9 " "	9 " "	Repair of fistula and treatment of strictures; urinary antiseptics.
6.	(a) H., Fanny	20.	Subacute cystitis.	7 " "	7 " "	Urinary antiseptics.
7.	(b) H., Fanny	20.	Subacute cystitis.	7 " "	7 " "	Urinary antiseptics.
8.	(a) K., William E.	26.	Ulcerative cystitis.	10 " "	10 " "	Avoidance of sexual excess; urinary antiseptics.
9.	(b) K., William E.	29.	Ulcerative cystitis.	12 " "	11 " "	Same as in Case 8.
10.	S., Bessie	25.	Neurasthenia.	13 " "	12 " "	Tonics.
			DISEASED KIDNEYS			
11.	C., Jennie	11.	Chronic parenchymatous nephritis.	14 light blue.	9 light blue.	Edebohl's decapsulation of right kidney.
12.	T., James	50.	Ureteral stricture (left).	7 dark blue.	30 " "	Refused ureteral dilatation.
13.	H., Mary	39.	Tuberculosis (right).	30 light "	12 dark "	Nephrectomy.
14.	D., William	38.	Tuberculosis (right); cystitis.	60 negative.	16 light "	Still under examination.
15.	O., Mrs. D.	31.	Pyonephrosis; occlusion of the left ureter.	7 dark blue	20 negative.	Nephrectomy.
16.	R., Oscar	28.	Calculus (ball valve in pelvis of left kidney).	19 " "	30 "	Nephrolithotomy.
17.	M., Grace	22.	Calculi; pyonephrosis; cyst (right)	20 negative Dressings covering lumbar fistula colored blue slightly after 1 hour.	7 dark blue.	Nephrectomy.

and number of escape of the blue colored urinary jets from the ureteral orifices, and the contractile and expansive power, the form, size, and pathological condition of the latter, together with a general study of the condition of the interior of the bladder. (See Table.)

In the series of cases above tabulated, the indigocarmin test demonstrated perfectly normal kidneys in ten cases. These were advised to undergo the examination on account of obscure vesical or urinary symptoms, or because of vague affections of abdominal organs where a determination of the integrity of the kidneys was desirable. An entirely healthy organ, that is one sufficient to care for the renal function, was proven to exist in five cases of surgically diseased kidneys requiring nephrotomies or nephrectomies. Finally, in two cases of unilateral renal or ureteral disease or both, the patient, in one instance, refused treatment, in the other nephrectomy is pending, but in both a correct diagnosis seems to be assured. It will be noted in the series of cases that it was possible to diagnosticate normal kidneys twenty-seven times, employing merely indigocarmin as a means of functional renal diagnosis, and in all instances, where associated with it, was confirmatory of the findings by ureteral catheterization.

An analysis of the times of elimination of the indigocarmin in the group of functionally normal kidneys demonstrates the fact that it occurred in 90 per cent of the cases between 7 and 14 minutes after its injection intramuscularly, and that in only 10 per cent was the excretion delayed longer than 15 minutes, and finally that the time limit for elimination from healthy kidneys was 20 minutes.[1]

In the majority of cases with normal kidneys, the blue coloration appeared on both sides synchronously and when not at the same time the variation was only from 1 to 4 minutes.

Although my experience has taught that

[1] It will be observed that in nephritis the excretion of anilin colors usually follows within the normal limits, although some authors have suggested that by this very test a differentiation between hemorrhagic and the other types of nephritis is possible. As an example I have incorporated one case, (No. 11 in table) of chronic parenchymatous nephritis, which is also of interest from the surgical standpoint. Five and a half weeks following a decapsulation of the right kidney, at which time the urine contained 10 grams of albumen per 100 cc. with a specific gravity 1045. I was requested to determine the condition of the sister organ in view of a second decapsulation, inasmuch as up to that time but slight improvement had occurred in the child's general condition. In view of the findings shown in the table, I was compelled to advise a continuation of internal medication, as I interpreted the functional capacity of the left kidney, if not normal to be at least better than the right, or the more affected of the two. Fortunately, ever since the time of my examination the child's health, unexpectedly, has manifested improvement, and the urine at present shows merely a trace of albumen and has a normal specific gravity.

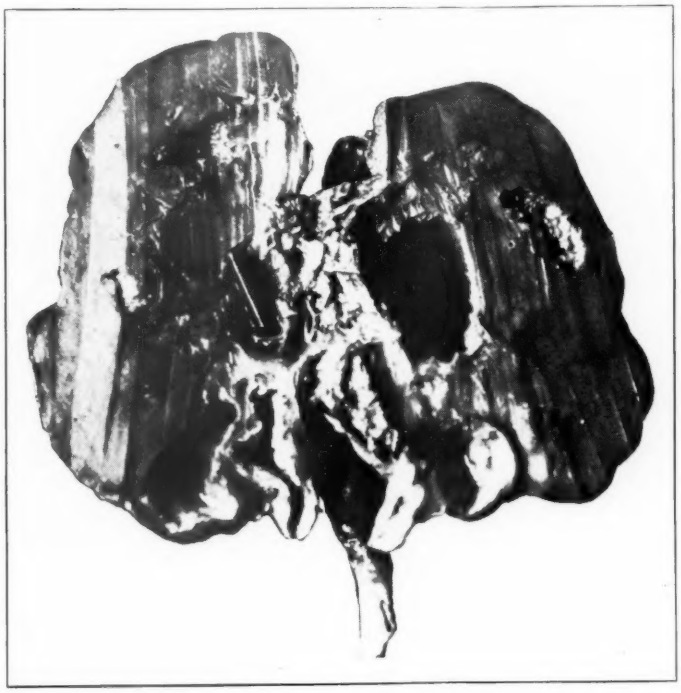

Fig. 1. Observe the tuberculous cavities and caseous areas lying within the parenchyma of the kidney. The pelvis is impregnated with numerous tubercles. A probe is seen introduced into the greatly thickened ureter.

some importance should be attached to the intensity of the color reaction, and the quantity and duration of this elimination, it is my belief that dependence on these alone would lead to erroneous conslusions, and it is undoubtedly true that the dark or light-blue color is proportional to the degree of concentration of the urine, while judgment as to the total quantity and duration of elimination can usually be formed for all practical purposes by observing carefully at the onset the initial time, character, and manner of excretion from the two ureteral orifices, that is, a comparative study which will frequently justify immediate diagnoses and prognoses.

In cases 13, 14 ,15, 16, and 17, the conditions demonstrated at operation confirmed so strikingly the results of chromocystoscopy that a few details may prove interesting.

Case 13. H., Mary, aged 39, was admitted to Dr. Frazier's service at the University Hospital on October 16, 1906, complaining of dysuria with frequency and urgency of urination and loss of weight, although of a robust development. There was some tenderness in the right hypochrondriac region, hypogastric, and appendiceal regions, and a firm, smooth, readily palpable, but only moderately tender mass in the right lumbar region. Temperature did not fluctuate and never rose over 98°. Leucocytic count numbered 4,560. Urinalysis of catheterized specimen demonstrated presence of albumen and a large quantity of pus containing the bacillus tuberculosis.

Two days after admission I catheterized the left ureter by the Kelly method to determine the functional condition of the left kidney. During the procedure large quantities of pus were observed to flow from the right ureteral orifice. The urine collected from the left side upon analysis proved to be normal, and was unproductive of tuberculosis in guinea pigs upon inoculation, which, confirmed in advance by the elimination of the *dark-blue color of indocarmin from the left ureteral orifice, 12 minutes after injection, and of the light-blue color from the right side not until after 30 minutes, was conclusive therefore to a favorable prognosis following nephrectomy.* Shortly afterward Dr. Frazier performed nephroureterectomy of the affected side, and a kidney and ureter, the sites of marked tuberculosis as repre-

Fig. 2. 1, Ureter; 2, Tubercles; 3, Ulcer; 4, Pus.

sented in the accompaning photograph (Fig. 1), were removed. The patient was discharged at the end of four weeks and is well to-day.

CASE 14. D., William, aged 38, was referred to me for chromocystoscopic examination from Dr. Tyson's service at the University Hospital on August 29, 1908, complaining of frequency of urination, pyuria, and loss of weight of only a few months duration. Temperature never rose over 99°. Leucocytic count numbered 11,500. Two attempts failed to find the tubercule bacillus in the urine.

Chromocystoscopic examination. This was somewhat difficult because of the great quantity of pus which welled forth from the right ureteral orifice and constantly clouded the fluid content of the bladder, and would have been impossible without an irrigation and evacuation cystoscope. A high-grade general cystitis, particularly marked on the right side and in the region of the trigonum and vesical sphincter, was manifest. A number of tubercules and tuberculous ulcers were present in the vicinity of the right ureteral orifice, which was larger than normal, appeared as a round, rigid inflamed hole or opening. The picture, unmistakably that of tuberculosis of the kidney and ureter, with extension to the bladder, is well represented in the drawing. (Fig. 2). *At the end of an hour no blue color occurred from the right ureter, indicative of advanced or perhaps total disease of the kidney, but in the view of the elimination of indigocarmin from the left kidney after 16 minutes, a nephrectomy of the right side was advised in the belief that the left was sufficient to discharge the renal function.*

CASE 15. O., Mrs. D., aged 31, was admitted to the University Hospital, November 6, 1907, complaining of a dull ache and tenderness in the right lumbar region, and a history of having been awakened during the night, two weeks prior to her admission, by a pain in the left side of the abdomen radiating to the region of the external genitalia, and severe enough to "double her up" and cause nausea and vomiting. A palpable, slightly tender mass, movable with respiration, was present in the left side of the abodmen. Urinalysis resulted negatively, the absence of leucocytes being especially noteworthy. Blood counts revealed 11,200 leucocytes, and the temperature was never over 98.6°. Three days after admission I performed chromocystoscopy to determine the functional sufficiency of the supposedly normal kidney, in view of the contemplated nephrectomy of the diseased organ and found the left ureteral orifice to be very small, atrophic and round, instead of presenting the usual eliptical appearance. *From the healthy side the dark-blue color was ejected in*

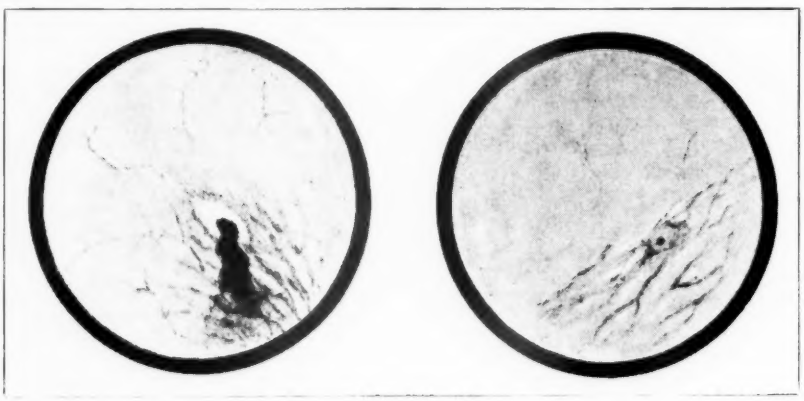

Fig. 3. In the figure on the left, the dark blue color of the indigocarmine is being ejected from the normal ureteral orifice; on the right, or affected side, there was no elimination of indigocarmine and the ureteral orifice appears very small, round and atrophic or non-functionating.

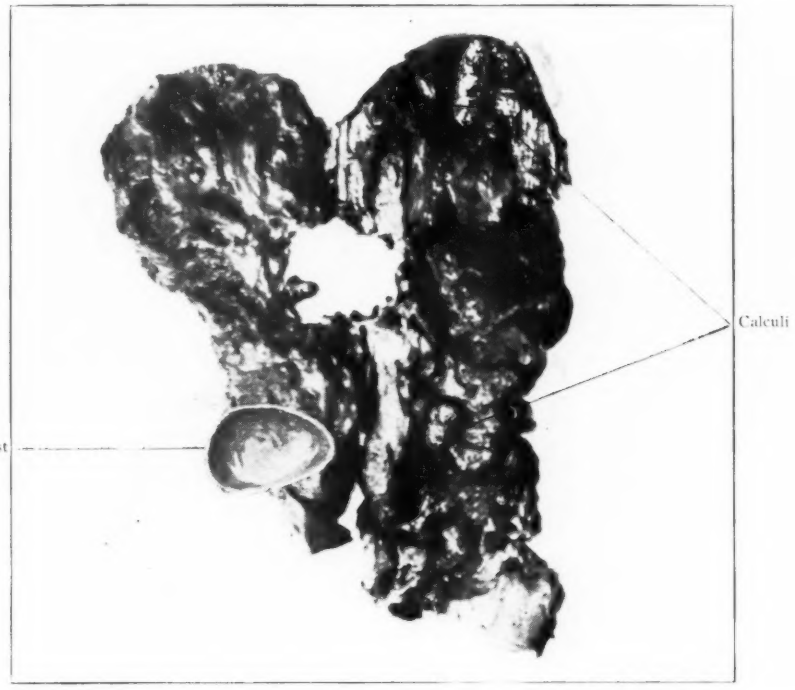

Fig. 4. Note particularly the smallness of the organ and the destruction of the parenchyma on account of the pathological processes present.

just 7 minutes after the injection of the indigocarmin, while from the affected side the entire absence of coloring matter, urine, or anything else during a period of 20 minutes was quite impressive. The conditions found are accurately portrayed by the submitted drawings (Fig. 3). It was evident that the left kidney and ureter were no longer functionating, and this opinion was confirmed when no urine was collectable after catheterization of the affected ureter. A diagnosis of pyonephrosis with complete occlusion of the ureter was made, also that the right kidney was sufficient to continue the renal function. Five days later, Dr. Frazier, through a lumbar incision, removed merely a shell of kidney tissue, the entire organ having been destroyed and supplanted by a sac of greenish-yellow pus. The patient passed through an uninterrupted and speedy convalescence.

CASE 16. R., Oscar, aged 28, was admitted to Dr. Frazier's service at the University Hospital, July 17, 1908, giving a history of repeated attacks of renal colic and having passed a stone per urethram, and at the time suffering from an attack of two days' duration, with the typical symptoms of pain referred to the left testicle and down the thigh. Urinalysis: Light yellow, cloudy; specific gravity 1025; acid; trace of mucous and albumen; few erythrocytes; many leucocytes. Leucocytic blood count numbered 13,900. *Chromocystoscopy revealed the elimination of indigocarmin from the right side after 19 minutes, indicative of the functional integrity of the right kidney; from the left ureteral orifice which was abnormally small, round and atrophic (a condition similar to that of case 15) no elimination of the coloring matter appeared in half of an hour.* From the history in conjunction with the use of indigocarmin a diagnosis of complete ureteral stenosis near the kidney pelvis, presumably due to calculus, was made. Subsequently a skiagraph showed the presence of a stone in the pelvis of the left kidney, which was confirmed by Dr. Frazier two days later at operation, and which, because of its rounded character, I regard as a "ball valve calculus," capable of the production of all the symptoms and chromocystoscopic findings. Recovery was uneventful.

CASE 17. M., Grace, aged 22, was admitted to the University Hospital and referred to me by Dr. Carnett for chromocystoscopic examination, on July 24, 1908, complaining of pain in the right lumbar region and a discharging sinus of one year's duration in the same locality. One year prior to admission a successful nephrolithotomy was performed by Dr. Price, of Philadelphia, but the wound never healed, and a continuous pyo-urinous suppuration resulted. When first seen

by Dr. Carnett her temperature, pulse, and respiration were 100°, 114, and 24, respectively. The urine, alkaline in reaction, showed a trace of albumen and a few leucocytes. The kidney was not palpable, but a skiagraph showed a stone about 1 cm. in diameter, located near the pelvis. Chromocystoscopy to determine the functional sufficiency or the left or normal kidney, *demonstrated the elimination of the dark-blue color of indigocarmin from the left side in 7 minutes. At the end of 20 minutes, or the expiration of the normal time limit, there had occurred no excretion of the coloring matter from the right ureteral orifice*, which, as in cases 15 and 16, was small, round, and presented a nonfunctionating appearance. The resident was instructed to watch the dressing covering the lumbar fistula and note the onset of blue discoloration. At the end of an hour a faint, bluish tint was observed, which was more pronounced after the second hour. This to my mind signified impairment of the function of the right kidney, and in view of the complete stenosis of the ureter with persistent lumbar fistula and functional sufficiency of the left kidney, nephrectomy was advised. The following day Dr. Carnett removed the right kidney, which was considerably distorted by disease and previous operation and not more than one half the normal size. The pelvis of the organ was in a state of chronic inflammation, and bathed in a quantity of purulent fluid. The calices showed evidence of distention in the presence of a chronic pyonephrosis. From the parenchyma, near the pelvis in the upper half of the kidney, a calculus 1 cm. in diameter was removed. In the extreme lower pole a second calculus 1 x ½ cm. in dimensions was found. Near the upper pole, in the direction of the hilus, a cyst 2 cm. in diameter, lined by a perfectly smooth glistened wall, was evacuated. At least half of the parenchyma of the organ seemed to have been destroyed by the virtue of the pathological process present. The condition of the kidney is perhaps better represents by the submitted photograph (Fig. 4). Convalescence following operation was uneventful, and the patient was discharged from the hospital at the end of two weeks, voiding 48 ounces of urine daily.

From a study of the above case the following conclusions seem to be justifiable:

1. Chromocystoscopy, with the use of indigocarmin, for the practical use of the surgeon, affords the same functional diagnostical advantages, in many cases, as cryoscopy, the phloridzin test and urea determination, the results of which are also not always infallible, and the technique and determination of which are tedious, complicated, and consumptive of much more time.

2. Comparative observations of the onset and intensity of the color elimination, frequently warrants conclusions as to the sufficiency or insufficiency of one or both kidneys, provided the ureters are patulous.

3. The duration or quantity of indigocarmin excretion is also of great diagnostical value, but ofttimes impractical and unnecessary of notation.

4. Aside from its value in diagnosis and prognosis in contemplated operative interference, chromocystoscopy is of great aid in ureteral diagnosis and catheterization.

5. Normal kidneys in 90 per cent of cases eliminate indigocarmin in 7 to 14 minutes after its injection intramuscularly; in only 10 per cent is the elimination delayed as long as 20 minutes.

6. If the blue coloration appears later than 20 minutes after the injection, the functional sufficiency of the kidney is probably impaired.

7. If the excretion fails to occur at all the kidney is the seat of a grave pathological process.

8. The intensity of the color reaction (dark blue or light blue) depends upon the concentration of the renal secretion and the individual secretory power of the organ.

9. A surgically diseased kidney eliminates the coloring matter less intensely than its normal sister organ, or not all.

10. The test is very simple and by observation of the two ureteral orifices, differences between the two kidneys are readily and speedily noted.

In conclusion I wish to express my gratitude to Drs. Frazier, Tyson, Carnett, Müller, and Fife, of Philadelphia, and Dr. Gifford, of West Chester, for the privilege of the report of a number of the above cases.

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TWO CASES OF POST-TRAUMATIC SARCOMA OF THE SKULL[1]

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IN view of the fact that sarcoma of the skull presents some clinical and pathological features differing from those presented by the growth of the same tumor in other parts of the body, the two following cases are deemed worthy of a brief report.

CASE 1. Mr. J. A. J., aged 47, manufacturer, presented himself in October, 1905, complaining of a small tumor in the left frontal region. He gave a history of having received, some months before, a hard blow at this point, by being struck by the edge of a plank. The trauma was followed by some swelling which soon subsided leaving neither swelling nor tenderness. Some months later he noticed at this point a small, hard swelling which he stated had grown more rapidly in the few weeks preceding the time when he presented himself for examination. His previous health had always been good; his family history was negative, and there was no history of specific infection.

On examination there was nothing to be found of importance in his general condition. On the left side of the forehead just below the hair line there was a small, round tumor about 2 cm. in diameter and elevated slightly above the level of the surrounding surface. The skin was movable over the tumor; there was neither tenderness nor fluctuation, and the tumor was apparently fixed to the deeper structure rather firmly.

In view of the possibility of gumma, it was decided to put the patient upon iodides, in spite of the fact that he denied any history of specific infection. The iodides were pushed to the limit of tolerance without any effect upon the tumor. Operation was then recommended and carried out about six weeks after the patient was first seen, or about the first week in December, 1905.

The operation was made by turning down a large horseshoe-shaped flap of skin with its base at the temporal region. The flap included the skin and all the tissues down to the periosteum. The tumor was found to be beneath the periosteum. After stripping back the flap, a somewhat smaller flap of periosteum was circumscribed and elevated at the edges, and by means of a chisel the outer table of the skull was removed with the periosteum over an area which extended three fourths to one inch from the tumor at all points. After the arrest of hæmorrhage, the flap was returned, after cutting away the subcutaneous tissue over the central portion of the flap. Healing per primam took place, but an area of necrosis appeared in the center of the flap some days after the operation owing to inadequate blood supply after removal of the subcutaneous tissues.

The patient was given the mixed toxines, receiving the injections once or twice a week, at points about the site of the tumor. The njections were followed by violent reactions with a dose of one fourth minim and even a dose of one tenth minim.

In about three months several nodules appeared about the periphery of the flap made at the time of operation (Fig. 1), and it was decided to make another attempt to remove the new nodules. This was carried out in the same manner as the first operation, except that a much larger flap was made with a more exten-

[1] Read before the Chicago Surgical Society, February 22, 1909.

Fig. 1. Case 1. Area of necrosis in flap of first operation and recurrent nodules along line of incision.

sive removal of bone and periosteum. Following the second operation, new nodules appeared within a few weeks and a later attempt, having in view the removal of a large area of the skull with the overlying soft parts en bloc had to be abandoned because the dura was found to be involved.

The patient shortly afterward developed brain-pressure symptoms, headaches, nausea, blindness, and mental changes, and died in December, 1906, one year after the first operation.

On examination of the tumor removed, it was found to be subperiosteal in location, being so loosely attached to both periosteum and bone as to admit of ready detachment with the finger. The bone at the point of detachment of the tumor was firm and hard, but rough, and studded with numerous sharp projecting points. The tumor itself was firm in consistency, about one and one half cm. to two cm. in diameter and three mm. in thickness; of a fibrous structure, the fibers running in a direction perpendicular to the surface of the skull, so that the tumor could be readily broken transversely between the fingers and thumb.

Microscopically, the tumor may be called an osteo-fibro-sarcoma. In the outer portions of the tumor are seen strands of fibrous tissue with a parallel arrangement, the general direction of the fibers being perpendicular to the bony surface. Between the strands of fibrous tissue are columns of cells with irregular deep staining nuclei showing here and there mitotic figures. On the side next to the skull are seen pink-stained areas of bone substance with characteristic stellate bone cells and surrounded by one or more layers of osteoblasts.

Case 2. W. E. D., age 55, carriage driver; entered the Central Free Dispensary, Chicago, June 30, 1908, giving the following history: In November, 1907, he fell, striking the right side of his head against a carriage lamp. About a week after the accident he noticed at the point of injury a slight swelling which gradually increased in size until in March, 1908, five months later, it was as large as a child's fist. At this time a physician incised the swelling, but only blood was evacuated. After the operation the tumor grew more rapidly, involving progressively the right side and back of the head and extending downward into the neck as shown in Fig. 2 and Fig. 3. Extensive necrosis of the tumor exposed the occipital bone, which was shown by X-ray examination to be thickened and rough and irregular on the external surface. The inner surface was smooth and regular and there were no compression symptoms.

There was little pain, but the patient was weak and his appetite poor.

The family history was negative and venereal disease denied.

A piece of tissue removed from the border of the sloughing area showed the typical picture of small, round-celled sarcoma, very rich in cells and presenting the picture of a very malignant and rapidly growing type of tumor.

The patient disappeared from the dispensary, but the records at the coroner's office show that he died October 6, 1908, from "hæmorrhage occurring in a malignant tumor of the head."

Osteo-sarcomata are divided as to their origin into periosteal and myelogenous.

The clinical course is the same as that of osteo-sarcomata of other bones except that a peculiar group of symptoms due to cerebral compression may arise when the tumor invades the dura. The richer the tumor is in cells, the more rapid is the development and the more rapidly progressive the clinical picture.

Fröhlking in 1895 reported five cases of sarcoma of the skull from the Göttingen Clinic and collected forty-three from the literature. Weisswange in 1897 reported three cases ob-

Fig. 2. Case 2. Lateral and posterior view showing site of primary tumor in the occipital region and extension into the neck below the right ear.

served at the Tübingen Clinic and collected eighty-five from the literature. These two papers present the most complete study of this class of tumors contained in the literature up to the present time.

From the studies presented in these two papers it appears that sarcoma of the bones of the skull is rare as compared with its occurrence in other bones of the body. The two sexes are practically equally affected — men being slightly oftener affected than women — and middle age appears to be the time of life in which most of the cases occur.

So far as the individual bones of the skull are concerned, the temporal bone seems to be most often affected, followed in order by the frontal, parietal, and occipital bones. Sarcoma of the base also occurs, one of Weisswange's cases being a case of sarcoma of the right temporal fossa.

In Weisswange's group of eighty-eight cases there were eighty-three in which the place of origin could be determined with a reasonable degree of certainty as follows:

From the periosteum, 23
From the bone, 40
From the dura, 20

Eighteen of the twenty-three tumors examined microscopically showed:

4 round celled
4 spindle celled
1 spindle giant celled
1 angio-sarcoma
3 fibro-sarcomata
2 osteo-sarcomata
3 chloromata

Among the forty sarcomata starting from the bone were:

1 myxo-sarcoma
8 round celled
7 spindle celled
1 giant celled
1 round-spindle celled
2 angio-sarcomata
2 spindle-giant celled
1 sarcoma carernosum
1 round-spindle celled — cystic degenerated
1 melanotic osteo-sarcoma
1 fibro-myxo-chondro-osteo-glia-sarcoma
1 telangiectatic myxo-sarcoma
1 osteo sarcoma

It will be seen that histologically the tumors arising from the bone are practically the same in type as those arising from the periosteum, except that giant celled or mixed types of giant celled with other forms occur more often in the tumors of bony origin.

Etiologically the same factors come into consideration as those involved in the etiology of sarcoma in general. Perhaps the question of the rôle of trauma in the etiology of sarcoma of the skull comes rather prominently forward in reading the histories of the cases reported, and especially is this so in the two cases reported at this time.

Among the forty-eight cases collected by Fröhlking nine cases or twenty-one per cent gave a history of previous trauma at the site of the tumor.

Löwanstine collected from the literature one hundred and eleven cases of sarcoma following a single trauma at the site of the tumor and reported four hundred and eighty-nine cases of sarcoma observed in Czerny's clinic at Heidelberg from 1807 to 1904. Of the four hundred and eighty-nine cases observed, twenty cases, or 4.5 per cent gave a definite history of a single trauma at the site of the tumor.

Löwenstine quotes the reports from other clinics as follows:

	Cases	Post Traumatic	
Wolf, Berlin	100	20	20%
Léibe, Strasburg	42	3	7%
Lèngwick, Copenhagen	579	15	2.5%
Machal, Strasburg	155	11	7%
Würz, Tübingen	82	6	7%
Rausch, Erlangen	51	6	12%

Virchow has described two cases of post traumatic periosteal ossifying sarcoma studied by himself.

Orth has reported two cases of sarcoma following trauma — one an angio-sarcoma of the testicle developing one year after trauma and the other a giant celled sarcoma of the lower jaw following a forcible and difficult tooth extraction.

Vogel has reported seven cases of sarcoma developing at the site of trauma, one of the femur, one of the tibia, one of the clavicle, three of the testicle, and one of the breast.

Löwenthal collected eight hundred cases of sarcoma, fifty of which are from the Pathological Institute at Munich from 1880 to 1892 inclusive. The post traumata course of these cases he grouped as follows:

1. Cases in which the patient recovered from the primary injury without symptoms, and later a slowly growing tumor developed as in our first case.

2. Cases in which, after recovery from this primary injury, pain reappeared followed by the swelling.

3. Cases in which the pain continued after the trauma and swelling developed later.

4. Cases in which the swelling appeared immediately or soon after the trauma and gradually increased as in our second case.

The percentage of tumors due to trauma varies according to the estimates of different author's from 2.5 per cent to as high as 44 per cent, an average of the various percentages gives 12.3 per cent according to Borst.

Ribbert says, "The origin of a sarcoma direct from a single trauma is very rare. The inflammation following the trauma and caused by it plays an important part in the relation between trauma and tumor, in that the cells whose relations are disturbed by the trauma (displaced cells) are afforded an opportunity to grow independently by the hyperæmia accompanying the inflammation."

Schrœder von der Kalk cut the nerve trunks and fractured the femurs in rabbits and saw, instead of normal callus, a tumor-like tissue develop. He ascribed this atypical cell growth to the lack of nerve influence. Rindfleisch seems to have shared this opinion with Schrœder.

Conheim thought a tumor could only grow at the site of a trauma in case misplaced embryonal cells were present at the time of the trauma.

Maas believed that only abnormal cells develop into tumors after trauma.

Verneul and Barwell believed that the irritation by extravasated blood was the cause of the tumor growth.

Herzfeld says, "A tumor may develop after trauma only when at the same time and place a germinal cell is set free and a suitable nutritive medium is present."

Ziegler lays down the following as essential conditions to establish the post-traumatic origin of any given tumor:

1. The tumor develops directly after the trauma on the basis of the swelling or directly on the scar from the wound.

2. The tumor must be palpable immediately after the acute swelling has subsided.

3. At the site of the trauma constant or intermittent pain is present and later a tumor develops.

It will thus be seen that a wide diversity of opinion exists among authors as to the etiologic relationship between trauma and subsequent tumor development, their opinions varying from the belief that all tumors are of traumatic origin to the belief that only under certain very limited circumstances can tumor be caused by trauma. There is an equally wide diversity of opinion as to the exact conditions under which in any given case the tumor is to be regarded as post traumatic. It must be admitted, however, that practically all observers have accorded trauma a place in the etiology of benign and malignant growths. All writers agree upon one point at least, namely, that the place of the trauma must correspond to the site of the tumor. As to the time relation of trauma and tumor, the relation between subjective and objective symptoms and the diagnosis of tumor, and the relation of trauma to the kind of tumor developed, there seems to be no definite agreement. From a critical study of the literature upon the relationship of trauma and tumor the following general statements may be made:

1. Under certain conditions a tumor, particularly a sarcoma, may be regarded as post-traumatic.

2. The exact rôle played by the trauma has not been satisfactorily explained.

3. The conditions under which any given tumor is to be regarded as post-traumatic in origin are not definitely established. As to how long after a trauma a tumor may be regarded as post-traumatic in origin can only be decided by a careful study of individual case reports.

From the standpoint of differential diagnosis the other conditions coming into consideration are the following:

1. Gumma.
2. Benign exostoses.
3. Cysts, particularly dermoid.
4. Tuberculosis.
5. Skull metastasis from malignant tumors primary in the other portions of the body.

The prognosis in sarcoma of the skull does not differ materially from the prognosis of sarcoma in general, depending very largely upon the character of each individual tumor. Among the eighty-eight cases reported by Weisswange, forty-five were operated upon, thirty-five radically, and ten died from operation. Eight of the thirty-five radical operations were incomplete or abandoned because of hæmorrhage, deeply seated tumor, shock, etc.

Of the thirty-five radically operated upon, thirteen were cured so far as the time of observation varying from six years to six months extended, and twelve had recurrence.

In the ten cases dying as a result of operation, air embolism, meningitis, septicæmia and thrombosis were assigned as the causes of death.

The cases of sarcoma of the dura give the worst prognosis, while periosteal and myelogenous give about the same prognosis, both as to operability and duration of life.

Weisswange summarizes his review of eighty-eight cases with the following conclusion:

1. Alveolar sarcoma of the cranium is rare.
2. The male sex is somewhat oftener affected than the female, while in cases of sarcoma in general the female sex is oftener affected than the male.
3. All ages are equally disposed.
4. The etiology is dark. Trauma appears to be a frequent cause.
5. The temporal bone is most often affected.
6. Fifty per cent of the tumors originate from the diploe. From the periosteum and dura each 25 per cent.
7. The prognosis is worst in the primary dura cases, better in the myelogenous and best in the periosteal cases. Tumors rich in cells and showing degenerative changes give the worst prognosis.
8. The earliest possible operation is to be carried out with wide removal of the entire thickness of the skull, including the dura, if necessary, with subsequent repair by plastic operation or artificial substitute for the bony wall of the cranium.

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ADENOMATA OF THE DESCENDING COLON, SIGMOID, AND RECTUM [1]

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THE glands occurring in mucous membranes are usually involved in all the inflammatory growths affecting the latter, leading frequently, in the intestinal canal, to the formation of polypoid growths, largely composed of loose connective tissue which has proliferated as the result of the chronic inflammation.

Adenomata of the mucous membranes occur most frequently as polyps, more rarely as flat tumors with broad bases. It is exceedingly difficult to differentiate between a true and an inflammatory growth, or in other words, between an adenoma of the mucous membrane and a glandular hyperplasia.

Clinical Characteristics of Adenomata of Mucous Membranes

Adenomata of the mucous membrane are benign tumors which never invade the deeper tissue. The submucosa and the mucularis mucosæ are the only portions of coat involved in these growths. They differ in formation and size. Their surfaces, which are covered by tissue resembling normal mucous membrane, are flat and somewhat nodular.

Adenomata of the gastrointestinal tract occur as single or multiple tumors. Frequently they appear in the form of polyps with thin pedicles, varying in size from that of a pea to that of a fist, with smooth, nodular, or villous surfaces; more rarely as flat, circumscribed, soft thickenings of the mucous membrane. In the stomach they occur most frequently in the pyloric region, developing from the pyloric glands. If they are so situated and become large enough, they may obstruct the pyloric orifice and be diagnosed clinically as carcinoma. (Lexer reports that he operated upon an adenoma of the stomach in an adult which was as large as a child's head. It was attached by a thin pedicle to the mucous membrane of the pylorus. The greater part of the tumor lay in the fundus.)

Adenomata of the intestinal canal develop from Lieberkuhn's glands; those occurring in the duodenum from, Brunner's glands (Salvioli). Single adenomata may occur in any part of the intestinal canal, but they are found more frequently in the lower part of the descending colon and rectum, developing in children as well as in adults. The pedicle of such a tumor which is usually round, may be stretched by feces passing over it, or as the result of frequent prolapse, until it becomes several centimeters in length.

Adenomata are more frequently seen in children than in adults. When they occur in children, the lower end of the rectum is more frequently the location of these tumors. In adults, these new growths are usually multiple and found high up in the rectum and in the lower part of the descending colon. They may, however, be thickly distributed throughout the whole intestinal canal.

Multiple adenomata of the intestines give rise to a peculiar and often severe clinical picture. Little is said of this condition in textbooks and practically nothing occurs in the current literature. I feel satisfied, however, that these growths occur more frequently, but owing to their location and symtomatology they are confused with malignant growths, unless one has had some previous experience with this condition.

I have had two cases in the past eight years, both occurring in adult females. The diagnosis in case number one, as will be seen, was not made until after an exploratory incision had been made. Case number two presented a symptomatology identical to case number one, which led up to rectal examination. The finding of polyps made the diagnosis certain. In reporting these two cases, I shall therefore endeavor to give in detail the symptoms of both cases, and until more definite symptoms of this condition are given, these will no doubt be helpful.

[1] Read before the Research Society of the College of Physicians and Surgeons.

CASE 1. Mrs. S. H., 48 years of age; occupation, housewife; 4 children, all in good health; labors, normal.

August 31, 1901. Six months ago patient was operated on for anal fistual, by Dr. Cushing; four weeks after leaving the hospital, patient began to have diarrhœa (four to six watery stools a day) with pain over lower part of abdomen and vomiting, occurring about one hour after meals.

September 1st. Patient was given test-breakfast of bread and water and removed in one hour; 40 cc. of clear fluid was removed; total acidity, 38 HCl .048; no lactic acid and nothing of importance microscopically. Patient was placed on a soft diet and put to rest.

September 4th. Vomiting has ceased; stools contain small amount of blood; pulse and temperature normal.

November 6th. Patient's condition has grown worse; she has lost about five pounds, vomiting at irregular intervals; stools have increased six to eight per day, each movement of the bowels being painful. Her complexion is sallow, tongue coated, pulse and temperature normal. Patient was given another test-meal, removed in one hour, total acidity, 30-HCl .022; no lactic acid. Feces were examined and found to contain blood and fecal matter, no pus or mucus.

November 8th. Patient has had a very bad night; has had ten watery stools, the last two containing bright red blood. On palpation the abdomen is soft with no definite point of tenderness. Temperature 98 degrees, pulse 60, weak.

November 9th. Patient vomited 8 A.M., the amount of vomitus corresponded very closely to the amount she had taken in during the past twenty-four hours; had a sour odor and contained particles of undigested food. No examination of the vomitus was made, as it had stood in an open vessel for six hours and decomposition had taken place.

November 12th. Patient seems to be somewhat better, diarrhœa has stopped; no pain, has not vomited for two days. Patient was sent to St. Agnes Sanitarium for a rest cure and remained there for three weeks. At first she seemed to improve but the diarrhœa and pain soon returned. Drs. Osler, Chambers, Preston; and J. Friedenwald were called in consultation. After carefully going over the symptoms the diagnosis of malignant growths in the stomach or small intestines was made. Dr. Osler advised against operation owing to the weak condition of the patient.

August 5, 1902. Patient again presented herself for treatment. In the meantime she had gone from one doctor to another without getting any decided relief. She now complains of the same symptoms, frequent watery stools containing a small amount of blood with severe pain in the left side. On palpation nothing definite can be made out.

August 6th. Patient has had fifteen stools each containing a little blood. She is in a rather exhausted condition, looks pale, and is very much emaciated. Blood examination; reds, 3,425,000; whites, 11,000; no differential count was made. On vaginal examination the pelvic organs were found to be apparently normal. Patient had been wearing a Hodges' pessary, which was removed. The patient was placed in the knee and chest position and a rectal examination made. Nothing could be ascertained by digital exploration and a long protoscope was introduced. As this was quite painful, a thorough exploration of the upper end of the rectum and sigmoid could not be made, patient refusing to take an anæsthetic for a more thorough examination. Patient was given a test meal and removed in one hour. Total acidity, 42, free HCl .034. Patient was put to bed on a liquid diet and small doses of morphia were given.

August 17th. Patient seemed to be relieved.

August 25th. Patient has had eighteen watery stools and quite a severe hæmorrhage followed the last. Patient is now in a very weak condition. Temperature 97⅘; pulse 60, weak. Stimulant.

August 28th. Blood examination was made and found to contain reds, 2,200,000; whites, 13,000. Feces were examined and found to contain large quantities of blood and fectal matter; no pus or mucus.

January 25, 1904. During this time patient has gained and lost. During the past six weeks she has averaged about ten stools a day; all have contained blood and each accompanied by severe pain.

July. Patient consulted Dr. Clark of Philadelphia and he advised an operation, which she consented to have done. The family asked me to be present at the operation as they all thought she would not recover from the anæsthetic.

Operation. The abdomen was opened to the left of the medium line; the descending colon was located and brought to the surface. The intestines and peritoneum were protected with packs. The lower third of the intestines and sigmoid was opened opposite its mesenteric attachment. After the colon was opened, small polypoid growths, varying in size from that of a pea to that of a hickory nut, attached to the mucous surface by a thin pedicle could be seen throughout its length; otherwise the mucous membrane presented a normal appearance. These polyps were grasped with a pair of small forceps and removed with Paquelin cautery. The incision was enlarged so that the upper end of the colon and sigmoid could be inspected. The upper end of colon was found to be free from these growths; the lower end, however, contained three or four polyps. These were removed. The colon was closed by the Connell suture; the abdominal wound closed without drainage.

Patient left the operating room in good condition and recovered from the ether rapidly without nausea. Patient made an uneventful recovery from the operation and left the hospital after five weeks. During her stay at the hospital, she had very little pain and after the first week had well-formed stools.

January 1, 1905. Patient presented herself for examination. She has gained twenty pounds in weight; has had little or no pain with only one or two movements a day.

August 1, 1905. Patient has had a little diarrhœa and some pain in the left side.

August 2. Patient has had three stools, the last containing what looked to be a blood clot but on examination proved to be a small polyp.

August 10th. Patient is free of pain and diarrhœa.

October, 1907. Patient has had diarrhœa for several days and some pain in the left side.

November 1st. Patient passed another polyp.

November 3d. Patient is now free of pain and diarrhœa.

November 25, 1908. Patient looks well, has gained six pounds, so she says, and has not had diarrhœa since last consultation.

CASE 2. Mrs. J. R., German, widow, age 58 years; family history good; has had eight children, last fifteen years ago; one miscarriage twenty years ago; labors normal except the first, which was long and tedious.

October 15, 1904. Patient began to have pain in the left side and diarrhœa about ten weeks ago. During this time she has lost forty pounds; previous to her illness she weighed 185 pounds. Patient now complains of feeling tired upon the least exertion; loss of appetite, pain in the left side, and from eight to ten watery stools a day; no vomiting; from all accounts she seems to digest her food well. However, a test meal was given and removed in one hour. The stomach contained only a small quantity of material; total acidity, 25 free HCl .12, no lactic acid. Vaginal examination; patient has an old tear in the perineum and a cystocele, uterus retroflexed.

From my previous experience with pain, diarrhœa, bloody stools, and enormous loss of weight, I suspicioned either malignancy or polypoids of the large intestines, my opinion, however, leaning toward the latter. I advised rectal examination under an anæsthesia. Patient consented. Examination under ether; on digital exploration nothing could be made out. Through a long sigmoidalscope a polyp attached to a thin pedicle could be clearly seen. This was removed for examination. The late Dr. N. G. Keirle, Jr., resident physician at the Hebrew Hospital, who assisted in the removal of the growth and examined the specimen reported it to be a true adenoma. Her condition was made known and an operation advised. To this she consented. The abdomen and colon were opened in the same manner as described in case number one. On opening the colon, small polyps could be seen scattered here and there attached to the mucous membrane by fine pedicles throughout the colon and upper end of the rectum. They were removed in the same manner as described in case number one; the colon and abdomen were closed in a like manner. Patient recovered nicely from the anæsthetic and left the hospital in six weeks.

During her stay at the hospital patient gained ten pounds, diarrhœa and pain ceasing on the fifth day after the operation. Patient was not seen again until February first, 1907, during which time she reports that she has enjoyed fairly good health, having neither diarrhœa nor pain.

PATHOLOGY

Pathological report by Dr. N. G. Keirle, Jr., number of growths received, 20, varying in size from 1 cc. to 1.5 cc. in diameter; soft and of a reddish color. Histologically, the specimen is made up of loose connective tissue and branched tubules acini. The cells stain in a uniform manner and show no tendency to invade or break through the basement membrane. The pathological report from the case operated on in Philadelphia was that of adenoma of the large intestine.

PROGNOSIS

If these growths are removed early, the outlook is favorable. Recurrent growths are not infrequent (Rotter); death may take place from inanition. The frequent and profuse hæmorrhages weaken the patient to such a marked degree that death may take place from some intercurrent disease. By far the most serious complication is that of malignancy. In twelve collected cases by Rotter, two died from malignancy.

SYMPTOMS

From the foregoing cases, it can be clearly seen that the cardinal symptoms of these new growths of the lower end of the intestinal tube are diarrhœa, pain in the left side, and rapid loss of weight The number of stools per day may range anywhere from two to twenty, containing a varying proportion of blood. The quantity of blood may be from a slight coloring of a stool to that of bright red blood mixed with a small amount of fecal matter. After profuse bleeding, rapid anæmia follows. In case number one, after a profuse hæmorrhage, the red blood count dropped to 2,200,000. Small polyps may be found in a stool especially after a hæmorrhage has taken place, and when found, are highly diagnostic of this condition. Mucus and pus are generally absent.

The pain is described as being more or less constant in the left side, which increases directly before and after a bowel movement. The pain is particularly severe after the patient has had a number of stools. Being worn out from the great number of stools and severe pain, the patient has a distressed look and an expression of anxiety and begs for relief. The temperature generally remains normal except after profuse hæmorrhage, then a subnormal temperature may be noted. The pulse generally ranges between 72 and 84; increase in the rate may be noted after a prolonged attack of pain.

DIAGNOSIS

Pain in the left side, diarrhœa with blood mixed stools, rapid loss of weight, absence of pus and mucus in the stools, and the absence of tumor formation along the colon or lower end of the rectum are highly diagnostic of this condition. A thorough examination of the rectum should never be neglected, as the finding of a polyp settles the question where doubt exists. They may, however, be situated up so high in the colon to be out of range of inspection. By not finding them, owing to their high location, should not prove their absence. The diagnosis should then rest on the three cardinal symptoms of pain, diarrhea with bloody stools, and great loss of weight. This condition must be differentiated from malignancy and the inflammatory diseases of the colon. From the former, especially in the early stages, constipation is more generally found than diarrhea, blood is not usually present, while the pain is of a milder character. During the latter stages of malignancy, the differential diagnosis is rather easy, the tumor formations and symptoms of obstruction are quite diagnostic of malignancy. The absence of pus and mucus in the stools is quite diagnostic from that of inflammatory conditions of the colon.

TREATMENT

Unless these growths are thoroughly and completely removed, little can be expected from palliative methods. Morphia is quite necessary for the relief of the pain and diarrhœa. Great care must be exercised in giving opium. The prompt relief which it brings to these patients is very apt to lead to the habit. Case number one, who had been given opium in one grain doses prior to her operation for the relief of the supposedly malignant pains, acquired the habit to a mild degree which proved rather troublesome after her operation.

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THE VALUE OF ENTEROSTOMY IN INTESTINAL OBSTRUCTION

BY J. P. LORD, M. D., OMAHA, NEBRASKA

ABSTRACT

Majority of cases of intestinal obstruction are seen too late to be operated without a high mortality. Too much anæsthetic, too much time, and too much surgery, are too large factors in this high mortality. A tentative operation for drainage of the bowel by some simple means a life saving measure in ileus peritonitis, mechanical obstruction, or paralysis. Later followed by radical operation as indicated. Four successive, successful, illustrative cases.

ALL of the phases of this subject have been so fully discussed by those large in experience, and pre-eminent in wisdom, and so considerable a number have added to our common knowledge by contributions from their experience in the use of this measure, that it is with some presumption that your essayist ventures to add aught to this moot subject.

Those surgeons who are called upon to travel considerable distances to reach cases of intestinal obstruction, or who have cases brought to them from afar, or, where the usual too much time has elapsed, ever feel the weight of oppression and almost apathy, arising from their experiences in intestinal obstruction. The mortality is hard to estimate, and is so shockingly high as to cause those doing surgery in the less populous centers, to feel keenly their unfortunate coercion, and to deplore their hopeless and thankless situation. But those in some of our greatest cities, where hospitals are everywhere at hand, would seem to be scarcely more favored to meet the emergency. According to Elsberg, "The mortality from intestinal obstruction, after operation, has been vari-

ously estimated at from 50 per cent to 70 per cent." "Of one hundred cases treated by operation in three large hospitals in New York City during 1906, 54 died." "Ranzi collected 758 cases from literature, with a mortality of 57 per cent. Other reports give a still higher death rate." The same author states, that in only about 10 per cent to 15 per cent of the cases admitted into Mt. Sinai Hospital, is the patient's condition still to be called a good one.

It is, therefore, our common experience that cases of intestinal obstruction are seen too late to be operated without a high mortality. The more extreme the conditions, the more surgery, the more time, and the more anæsthetic necessitated to meet the requirements of complete mechanical and functional relief. These factors, except that of anæsthesia, have been recognized by surgeons for more than a hundred years. The baneful influence of anæsthesia in those already toxic has been long recognized, hence the efforts to minimize its use or to escape it altogether. Local anæsthesia, therefore, is preferred by those who fully recognize its uses and value in the cases whose emunctories are already overwhelmed, and those in whom only the most tentative intervention will be tolerated. The tendency to limit the anæsthetic, time of operation, amount of intervention, and at the same time bring the immediate relief so urgent to relieve the intestinal canal of its fatally toxic contents, has grown to such extent as to be recognized as the practice to follow. Guided by these principles, radical or complete operations must be eschewed in a still larger proportion of our cases. The drainage of the intestines loaded with deadly toxic material should be accomplished by the simplest, shortest, safest, and best means at our command. These requirements are most often met by enterostomy, according to the E. J. Senn or Kader technic. Obviously this particular technic has been used by but few, and the origin of its application as applied to enterostomy, uncertain. Its advantages, however, should be grasped by all, for by it, many of the disadvantages of old time enterostomy, and of enterostomy in its divers forms, are obviated. Notwithstanding the fact that Mr. Treves credits enterostomy with a large share in his success in the treatment of intestinal obstruction, yet he prejudices his readers by alluding to it as a "rough and ready operation." But finally he says, "Above all the arguments remains the fact, that this undoubtedly uncouth measure has been the means of life saving."

According to Nicholas Senn, enterostomy was recommended by Louis in 1757. First successfully performed by Renault in 1787. Nelaton revived the operation in 1840. So strong was his impress of the importance of this procedure, that the operation still bears his name. Practically all surgeons have recognized its value. Done in the original way, however, too many objections have clung to it, to favor as frequent resort to it as its value justifies.

Enterostomy done after the method of an Emanuel Senn gastrostomy, the chief objections to the operation are eliminated, the danger of peritoneal soiling minimized, skin excoriation prevented, and both inanition and secondary operation for closure avoided. The catheter may be removed and reinserted at will, and even though the opening happens to be made high in the bowel, no fistula remains to cause inanition. Secondary operations for closure are rarely necessary. The ease, facility, and dispatch with which it may be done in the modern way (under local anæsthesia) favors its performance in both those in extremis and those not yet apparently in a dangerous condition, and hence, in the latter class, relief is forthcoming before toxæmia and mechanical distention have made recovery impossible. The writer is not urging this measure in all cases. A few are seen sufficiently early to allow of the necessary search, and the required measures to afford complete and permanent relief. But the facts are, that from 50 to 80 per cent (Elsberg) of all cases of intestinal obstruction, among surgeons the world over, result fatally. With the seeming improved results from this "tide over" procedure, we are becoming more impressed with the folly of radical intervention, except in a relatively limited number.

It is not the purpose of the writer, however, to discuss the merits of enterostomy. Its advantages and disadvantages have been fully established in our literature by those of established authority. To rediscuss all of the phases of this subject would not only be presuming upon the time, but the intelligence of

this body. But the advantages of enterostomy by the method of Senn or of Kader should be better understood, more often, and more early applied, because its former uncouthness and chief objectionable features are removed. This is the special plea from your essayist. The value of the method has been established in the practice of many besides himself. And its value should be so fully recognized by all, as to make it a factor in reducing the present appalling mortality from the toxæmia resulting from a blocked alimentary canal. Robbed of its hitherto formidable surgical aspects, there should be less reason for general practitioners to allow their patients to reach the danger line, extremis, or die for lack of a procedure which they might do if its indications and necessities were more fully impressed upon them. The present generation of practitioners can be trusted to help our mortality rate. Surgery is no more confined to our cities. Acute abdominal crises receive more intelligent treatment than formerly by the cross-roads doctor. The men who can manage complicated cases of labor successfully will in the future meet other emergencies also. The hospital training so common among a large number of our present-day graduates is going to have a large influence in bringing to every community men with the ability to diagnose, and the skill to relieve, the majority of acute surgical emergencies. Hence the mortality of intestinal obstruction is to be lowered in the near future, and modern enterostomy for both early and late drainage of the bowel is destined to be a greater factor in this result.

Case 1. J. A., age 38. Had been operated eight years previously for suppurative appendicitis, and acute intestinal obstruction had occurred on the eleventh day, for which laparotomy was promptly done, and an angulated ileum freed. Recovery. March 12, 1908, at St. Joseph's Hospital, operation was necessitated for chronic obstruction. Numerous adhesions of ileum, cæcum, and omentum, which were freed from each other, and from the pelvis and the bladder; sero-plasty and omento-plasty of raw surfaces. Paralytic ileus became well marked on the fifth day. No relief from usual measures. Wound reopened. No point of obstruction found. Ileus apparently due to peritonitis. Enterostomy by Stewart's method with Murphy button. Slow abatement of symptoms. Enterorraphy for closure of fistula third week, failure. In the seventh week resection eight inches contracted ileum, (responsible for failures) side to side enterorraphy, successful. Complete recovery.

Case 2. Mrs. K., age 35. Perforative appendicitis. Diffuse suppurative peritonitis, seen on fourth day, with Dr. Wearne. Removed to Omaha General Hospital. Gangrenous appendix removed. Tubage and cigarette drainage and counter drainage. Wounds left open. Main incision right rectus. Wound tamponed with rubber-covered gauze-pads to protect intestines and prevent adhesions. Improvement from desperate condition immediate. Drainage gradually eliminated. Acute obstruction on ninth day. When seen, six hours after onset, patient had sunken eyes, cold sodden skin, pulse 150, temperature 96. Operation immediate. Morphine-atropine and cocaine anæsthesia. Angulation of ileum by adhesions freed. First presenting loop of ileum entered by the catheter, secured by three tobacco-pouch sutures of catgut, ileum likewise secured to peritoneum. The drainage gave immediate improvement in symptoms, which recurred, however, on the third day, when catheter had been removed for twelve hours, and before cathartic had operated. Temporary reintroduction of catheter gave relief. Convalescence uninterrupted. Fistula closed immediately after removal of catheter. Recovery complete.

Case 3. Age 18. Operated by Dr. Powell at the Swedish Mission Hospital, May 1, '08, for suppurative appendicitis. Acute intestinal obstruction on twentieth day. Operation on twenty-first day by Dr. Powell, at which writer was present in consultation. Extreme conditions precluded extended manipulations. Relief from operation by separation of adhesions seemed uncertain. Impressed with the value of enterostomy and its applicability in the case, the writer was permitted to introduce a catheter into the ileum by the Senn method. Drainage was free and the bowel was irrigated with salt solution. The symptoms subsided at once, but returned upon accidental removal of tube on the second day. Improvement followed its reintroduction. No symptoms followed its final removal on the tenth day. The fistula closed. Recovery uneventful.

Case 4. Mrs. L. Age 48. Referred by Dr. Payne, Sept. 27, '08, Clarkson Hospital. On sixth day after operation for relief of complicated conditions within the pelvis with adhesions, after numerous operations by other surgeons, acute intestinal obstruction supervened. A reopening of the abdomen was recommended and refused. After twelve hours of persuasion and resort to usual measures, not including cathartics, consent to operation was obtained and the distended cæcum was drained by catheter introduced by Senn method, after having freed light re-formed adhesions in the pelvis. Drainage and discharge of gas free, and relief prompt. No movement of the bowels was secured until three days, when normal movements were secured by enemas and normal salt irrigation of bowel through catheter. Recovery was uninterrupted and is now complete.

THE UTERO-SACRAL LIGAMENTS

By DANIEL H. CRAIG, M. D., Boston, Massachusetts

WITHIN the past few years the importance of the utero-sacral ligaments has come to be very generally recognized by the gynecologist, but they still remain very vague, hypothetical structures in the minds of those not specially interested in this particular branch of our work.

It seems time, however, that every physician who is, or may be, called upon to treat women with pelvic lesions should recognize that these ligaments are very real and important anatomical entities, and that failure to so regard them is only too often the cause of disappointing failures in both operative and nonoperative treatment of many pelvic cases, whether such cases be of an inflammatory nature or of displacement.

Description of these ligaments, so necessary three and one-half years ago at the time when I presented my views, indirectly it is true, to the Southern Surgical and Gynecological Association (Chronic Endocervicitis. A New Method of Treatment with New Instruments. Trans. Southern Surg. and Gyn. Asso., vol. xviii, pp. 342 et seq.) has now become a work of supererogation. But those who may consider the following statements too arbitrary are requested to read that article with its arguments before condemning.

This paper was particularly suggested by several papers recently published which, from my careful observation of a large number of cases in which these ligaments were a morbific factor, seem to me to offer fallacious teaching. For instance, several papers have appeared urging operation upon these ligaments when no other operative procedure was contemplated, some even advocating opening the abdomen so as to reach them from above when no other indication for coeliotomy existed. This latter especially I consider the extreme of bad advice and bad surgery. While it is undeniably true that contraction of these ligaments may be productive of symptoms extremely annoying and even disabling, either through their severity or through their unremitting persistence and obstinately prolonged duration, the number of cases in which surgical interference for them *alone* is demanded is extremely small. Such interference is only indicated or indeed justifiable in cases of such long standing that the original lesions upon which this contraction depended have entirely disappeared, leaving a contracted, thickened ligament so infiltrated and indurated by adventitious fibrous tissue as to render its absoption out of the question. If, however, other pelvic lesions demand operative attention, neglecting to, at the same time, give any needed attention to the utero-sacral ligaments is, on the other hand, equally as reprehensible as the above mentioned coeliotomy. And in using the expression unjustifiable coeliotomy, I do so deliberately and advisedly, as the utero-sacral ligaments are too easily accessible, in skilled hands, through the vagina, any needed manipulation most often being possible without even the smallest opening into the peritoneal cavity, to ever justify the opening of the abdomen above the pubes without other indication.

Now, in reference to some contentions common to most papers upon this subject. Practically all seem to assume that the lesions found in these ligaments, be they thickening, contraction, inflammation, or what not, excepting malattachment to the uterus, relatively common, are primarily in the ligaments themselves. But this is very rarely true. A very large majority of utero-sacral ligaments felt through the vaginal vault as more rigid, thicker, and more tender than normal are not diseased at all but are merely performing one of their very important functions. Of course, one of the functions of these ligaments is to retain the cervix uteri a given distance behind the point of antero-posterior axial rotation of the uterus. In order that this function may be adequately performed they are relatively complex structures. They are not a mere mass of fibrous tissue like the ligaments of the joints. In fact, there is so much muscular tissue in their composition as to make the designation "ligament" almost a misnomer. They are

made up of peritoneal folds, muscle, and fibrous tissue. Being attached normally below the level of the point of antero-posterior rotation which point is determined by the fascial attachment to the uterus and more particularly by the attachment to the uterus of the band of strong tissue in the bases of the broad ligament commonly designated by the Germans as the "cardinal ligaments," their contraction or relaxation maintains the cervix at a variable distance behind this axial point thereby of course, as a corollary, maintaining the fundus of the uterus an equally variable distance anterior to this same point. It can, therefore, be readily seen that nothing better serves to drag an inflamed cervix upward, backward, and out of the ordinary range of minor irritations, as well as to immobilize it, than the contraction of these same ligaments, and being muscular if they are contracted they must of necessity be thickened and as this contraction is often a form of prolonged spasm, they are naturally tender to the touch. Any one who has examined a well marked case of retrocession, or retroposition, of the uterus, has an idea of the extent to which a contraction of the muscular tissue in these ligaments can retract and immobilize the uterus, and more especially the cervix. And this brings us to the fact that a very great majority of the cases of contraction and thickening of these ligaments spoken of as inflammatory are neither more nor less than a salutory, physiological action of these important structures in their effort to defend some other part really inflamed, especially the cervix.

On the other hand it is perfectly true that adjacent inflammation may, and sometimes does, actually invade the ligaments themselves, especially the peritoneal folds at the upper border. But it is equally true that this distinction cannot be made from the symptoms and often not from the touch, but by inference and a general knowledge of the nature and extent of the adjacent inflammatory process.

The contraction, which I have called "defensive," gives rise to a most distressing form of backache, which is certainly deserving of the quickest relief consistent with permanent results. Several years of careful study have convinced me that the quickest, surest, and only permanent way of curing this pain is to remove the primary cause of the contraction, and careful diagnosis rarely fails to discover it, except in the one class of extremely old, indurated and infiltrated ligaments above mentioned.

Therefore, always except in that one small class of cases, the operation of cutting these contracted, thickened, and tender ligaments when such contraction, though painful, is purely defensive of adjacent inflammation seems to me just as rational as whipping a child until it cries and then whipping it because it cries.

As my views as to the primary cause of many, if not most, of these cases were outlined and treatment suggested in the above mentioned paper, it is not necessary to repeat that portion of the subject at this time.

SHOCK, AND ITS RELATION TO OPERATIONS OF EMERGENCY [1]

By W. H. ALLPORT, M. D.

WHAT is shock? cries Medicus, and, Pilate-like, stays not for answer — at least not for any satisfactory one.

This mighty problem, with its added elements of unsolved mystery and expectant apprehension, furnishes always a most dramatic proof of the power of elemental force over man. That the tragic, often poetic, quality of these manifestations is appreciated even by the surgeon, the literature abundantly shows. Many years ago the elder Gross, with graphic terseness, described shock as a "rude unhinging of the machinery of life," and Crile in recent years pictures it Homerically as "a momentary pause in the act of death, soon followed by the grim reality."

But even when the surgical pathologist gives up figures of speech the same unsatisfying mystery is still here, and the searcher after truth still feels that the causes and operation of many forms of surgical shock have never been intelligently explained. Thus Leyden[2] thought it a *reflex inhibition* of the cord centers governing the peripheral vaso-motors and their vessels. Blum thought the condition one mainly of *cardiac exhaution*. W. H. Howell thinks there are two forms of shock which may operate independently, *cardiac exhaution*, or *inhibition*, as in severe fright, and *vaso-motor paralysis*, as in severe injuries where the cord and medullary centers sustain the heaviest weight of the blow on the nervous system. It is interesting to note, historically, that W. W. Keen, with Weir-Mitchell, and Morehouse, in 1864 was the first to put forth the theory that shock was an *exhaustion* of vaso-motor activity, and that Crile in 1908, writing in W.W. Keen's System of Surgery, propounds the same theory even more strongly. On the other hand, two excellent modern writers, Porter, a physiologist, and Malcolm, a clinician, have shown that arterioles are contracted in shock, and hence that the vaso-motors cannot be paralyzed as contended by Keen and Crile; the pallor of the shocked patient is certainly too well known to be easily ignored. Finally a German medical friend assures me that shock is sepsis — nothing but acute sepsis! If such is finally the truth, the virulently active microbe of Pirogoff's gangrene has something to learn in point of speed from this latest star in the bacterial sky.

To sum up: We may regard shock as either (1) an inhibition due to profound stimulation; (2) as a temporary fatigue-paralysis resulting from instantaneous and fulminant overstimulation, or (3) as a certain hyper-conscious and erythistic mental state akin to fright, which cannot as yet be traced to any vaso-motor source. We must agree that there is in all cases of shock a universal suspension of automatic function, and we note that at the bedside the quantity of the shock and the resistance of the victim are best spelled out through the response of the circulation in terms of peripheral blood pressure and pulse-rate. Where the blood pressure is good there is no shock. The essence of shock is low pressure in the arterioles due to banking up of blood in the viscera.

But at this point we often find ourselves frankly in a quandary over distinguishing clinically between shock and hæmorrhage. Who has not puzzled over the problem whether a certain anæmic, low-tension pulse indicated the general vascular emptiness of hæmorrhage, or merely that lying peripheral emptiness due to the surging of blood into the viscera, which occurs in shock. How much the more perplexing is the problem when it is obvious that both emergencies are present but in unknown proportions. Two physiological phenomena come here to our assistance: (1) the pulmonary anæmia of hæmorrhage is accompanied by rhythmic efforts to secure a more generous supply of air for the blood remaining in the system — air-hunger; (2) cerebral anæmia results in waves of unconsciousness, especially when slight exertion draws off the little blood

[2] An interesting but incomplete resumé of the theories of shock in J. A. M. A, Vol. LII, No. 1, Seelig & Lyon.

[1] Read at the Second Annual Meeting of the Surgeons of the I. C. R. R., Y. & M. V. R. R., and I. S. R. R., February, 1909.

left to nourish the brain — recurrent syncope. In simple shock, the sinuses of the brain and lungs are not anæmic, and the patient suffers neither from air-hunger nor from any well-marked syncope unless a fatal termination is close at hand. It cannot be denied, however, that these two symptoms, which are pre-eminently characteristic of uncomplicated hæmorrhage, often become inseparably blended — when the patient has been bleeding — with the general evidences of shock, and it must be left to the discriminating judgment of the surgeon to decide which of the two surgical emergencies is most largely responsible for the predicament.

The following sad and instructive case occurred in the practice of the writer, and is of added interest not only because it illustrates unusually the erythistic variety of shock, but also because of the relation which a probably faulty differential diagnosis bore to the treatment and outcome of the case. An anæmic and extremely neurotic young woman, an orphan, was operated for long-standing tibial necrosis. There were several fœtid sinuses and an enormous involucrum which required extensive chiseling to facilitate removal of the large sequestrum. Prior to the operation she was badly frightened and received morphine ¼ hypodermatically. During the operation the pulse did not behave unusually, the patient did not lose any large amount of blood, and there was no subsequent hæmorrhage. After the operation, consciousness partly returned, but she still seemed unduly frightened, moved the eyes from side to side in constant nystagmus, and sighed deeply at rather regular intervals. There was an incessant involuntary tremor of the voluntary muscles, which never became organized into a general convulsion. The pupils were contracted, and there came on presently a worried delirium which passed gradually into a coma. During the erythistic stages of this condition the skin was not cold or moist, and the pulse, though hurried, was not of particularly bad quality, hardly indicating, until the last, that a fatal termination was imminent. In spite of repeated hypodermoclysis and heavy stimulation, the coma deepened and the patient died twelve hours after the operation.

This case recalls forcibly the observation of Trevor that "in shock the loss of even a small amount of blood is apt to prove fatal." It would appear to the writer that this patient died of shock, *plus* a small hæmorrhage, and that the hypodermoclysis only increased the column of blood already collected in the viscera.

The importance of forming a correct estimate of the relation which each of these factors bears to the general condition of the patient becomes plain, when we note that the universal anæmia of hæmorrhage calls for reinforcement of the circulation, whilst the peripheral anæmia of shock calls simply for a cautious readjustment. This is well illustrated in the case just cited, where repeated hypodermoclysis produced no good result and may have hastened the end.[1] It is not at all unlikely that many a heart which has been but temporarily embarassed through mere visceral congestion has been hopelessly drowned by an added flood of normal salt solution. Just as true is it that large doses of diffusible stimulants and vaso-constrictors can do little permanent good by belaboring a circulation which has become emptied and fagged-out by extravascular hæmorrhage.

It is not usual, fortunately, to find these finer points in differential diagnosis arising in railroad surgery; for in great traumatism the rule is to find shock complicated by frank and copious hæmorrhage, so that treatment of the one becomes merged, without detriment to the patient, into that of the other. It must be well borne in mind, however, that the object of treatment is to secure both augmented circulation to relieve anæmia, and equalized blood pressure to counteract shock.

It is not the intention of this paper to enter into a lengthy discussion of the therapeutics of shock and hæmorrhage, but an outline of the treatment of such cases as commonly occur in railroad surgical practice will be found under section 8 of the Summary.

We now come to the important question, Is it advisable to operate during the shock following major traumatisms, and if not during such shock, how should the reaction be estimated, and how soon thereafter should we interfere?

It is no easy matter to arrive at a correct opinion that shock is definitely subsiding, but even after such opinion has been reached, the obligation to form a correct estimate of the vital cost of again lowering the blood pressure by operation is one of the most trying of surgical duties.[2] The bridge over which the pa-

[1] Maunsell Moullin in Ashhurst, Vol. I, p. 372. "Transfusion is of no value unaccompanied by hæmorrhage," and "infundations only increase the amount of fluid already stagnating in the viscera."

[2] Crile, Keen, Vol. I, p. 929.

tient must pass back to life is at best but a rickety structure, and any false step may plunge him again into the death from which he is feebly emerging. For shock is partial death, or at least a strong foreshadowing of the real thing, and we must admit that any measure undertaken in the face of this all-important emergency must be considered with reference to its primary effect on the shock. Nor can we deny that all major operations are themselves unavoidably productive of great vital depression. Thus, if we operate during shock we add more to that which already pre-exists, and there can hardly be but one outcome, unless there are special and local conditions justifying interference, or some special providence watching after the interests of the patient. Any plea made to justify a major operation undertaken during a period of maximum vital depression must be fallacious if based on any general reasoning. The only defense for such an operation must lie — if at all — in local or special conditions not governed by the usual rules of surgery.

This tendency to special pleading on the part of those who would unduly hasten operative interference is well illustrated in the case of a certain house surgeon with whom our hospital was once afflicted. He was the victim — temporarily — of a restless and overweening propensity for saving life. Prosperity has since quieted him down into a useful and conservative surgeon, but at that time the attending man had to be pretty spry in reaching the scene of action to prevent that "cub" from cutting off the leg himself during the first thirty minutes. He had four stock excuses: (1) "The relatives were getting restless;" (2) "I had to amputate to relieve shock;" (3) "The moment of reaction had arrived," and (4) a general blanket excuse to cover everything else, "I couldn't let the man die."

If it is conceded at once that the rapid separation — without sawing of bone or suture of tissues — of limbs already practically severed comes well within informal first aid duties, we will find that these four lame excuses cover about all the special pleas ever advanced to justify operations during shock. Of the first and fourth it can only be said that they are extremely weak apologies for seeing crooked; of the second excuse, it is but charitable to say that the operator betook himself along the most dangerous path, when gentler therapeutic resources were available, had he known enough, or chosen, to select them. The third excuse is of course made only when the patient dies after operation, and covers a corresponding poverty of diagnostic resource. For if the surgeon, after availing himself of all his therapeutic resources, has carefully sought for and correctly weighed all the evidences of genuine and maximum reaction, before risking the patient's all on the operation, he is not likely to have to excuse himself later on for an unlucky venture.

The following symptoms should show collectively a definite amelioration before it is safe to predicate that there is a permanent subsidence of shock:

1. The skin and extremities should become warm.
2. The rectal temperature should again become normal.
3. The blood-pressure should show a permanent improvement.
4. The air-hunger and recurrent syncope of hæmorrhage should subside.
5. The muscular tone should return.
6. The mental state should become both calmer and brighter.

In sever shock even the most radical should be willing to follow Guthrie's rule to "wait four to six hours till the pulse comes up and the patient commences again to feel pain — otherwise, don't operate." It is modern experience that the period of accumulating reaction often extends even into the second twelve hours with a good final result, if the operator will but have the patience to wait that long. It is the waiting game saves the most of the savable patients, and in the face of unrelieved shock it is the plain duty of the surgeon to lead no operative forlorn hopes.

SUMMARY

1. Shock is a cardio-vascular disturbance which may be produced either by direct inhibition, or through the exhaustion of nerve and muscle incidental to profound and sudden stimulation. It may be accompanied by or confine itself to a psychopathic disturbance akin to, but not identical with, fright.

2. The dictum of Trevor that "syncope is an epitome of shock" is fallacious, since that aphorism is based on the assumption that the heart is the only organ influenced — the peri-

pheral vaso-motors suffer quite as much as the heart, both from inhibition and from actual exhaustion.

3. The extent of shock and the individual resistance are best measured in terms of blood-pressure — without lowered blood pressure there can be no shock. The higher nerve centers are also profoundly affected, but science has not even begun to study the pathology of their disturbance. The surgeon caring for these cases should ever study the quality of the pulse and the temper of the patient's mind.

4. Shock is a step in the process of death, but it is capable of spontaneous arrest, and the patient may not show within twenty-four hours that he has ever passed through such a disturbance.[1] The bearing of this observation on the actual therapeutic value of a delaying policy is obvious.

5. It is invariably accompanied by peripheral anæmia. This anæmia may be due to extravascular hæmorrhage from severed vessels — the entire circulation may be empty; or it may be intra-vascular and due to congestion behind the heart without external hæmorrhage. In other words, the patient bleeds into his own internal sinuses. In this internal distribution of extra blood the brain and lung sinuses receive their share.

6. Hence arise two important differential symptoms to separate hæmorrhage from shock, air-hunger (Luftnoth) and recurrent syncope, to indicate a true pulmonary and cerebral anæmia in hæmorrhage not present in uncomplicated shock.

7. But shock as met with in railroad surgery, and especially in such cases as call for timely operation, is usually accompanied by open hæmorrhage, and the surgeon may safely assume that the usual treatment for acute anæmia will not be contra-indicated by any serious internal congestion.

8. Before any formal surgical operation is even considered, the following therapeutic indications are paramount, and are mentioned in the order in which they should be taken up by the surgeon. It will be noticed that they do not differ materially from those to be met in military service on the "first line of defense."

A. Pain must be relieved and hæmorrhage checked wherever and whenever the patient is first seen, since in the face of the first shock will increase, and with the continuance of the second anæmia will become more and more the true cause of ultimate death.

B. Pain may be relieved by local nerve blocking with cocaine, or by morphia as a general anodyne — preferably by both. Hæmorrhage is to be met by ligation — *en masse* if necessary, after the use of morphine, and cocaine *en bloc* — or else by *efficient* temporary constriction. For none of these measures, nor for the following, should — at the most — more than a few whiffs of ether be necessary, and chloroform is absolutely contra-indicated in all cases where there is even the suspicion of cardiac shock.

C. The severance of limbs already practically amputated should be completed, but without suture of tissues, or sawing of bone.[2]

D. Temporary dressings and splints should be applied with as little manipulation or disinfection as possible, and only sufficient to meet the requirements of transportation and to allow the institution of measures to allay shock and recoup hæmorrhage. Repeated and careless handling of parts only add to shock and cannot be excused on any premature plea for disinfection.

E. Should the patient's condition warrant it, or should the surroundings be cold, damp, dark, or otherwise so unfavorable as to add to already existing shock, the patient should be transferred to the nearest place favorable for operation or treatment. Double transfers are to be avoided. The surgeon is reminded that in the face of continued shock any extended transfer is quite as apt to be fatal as are radical operative measures.

F. It is assumed that pain and hæmorrhage have been controlled. For the relief of shock and accompanying anæmia the following measures are strongly recommended, and as nearly as possible in the order which follows:

a. The application and maintenance of dry heat in all forms. But never forget that a

[1] Goltz showed long ago in his familiar experiments on the frog that shock could cause temporary death through engorgement of the viscera and cessation of the heart's action (Maunsell-Moullin in Ashhurst, Vol. I, p. 366). Our own surgeon-physiologist Crile within the last decade has proved conclusively on the operating table that human heart death may be but temporary if the right measures are promptly instituted (Keen Vol. I, p. 939).

[2] Pirogoff, during the Crimea, noted that shock was invariably increased during the process of sawing. In many amputations Crile uses the Gigli saw to avoid handling the tissues or bone.

patient stupefied by shock or opiates may be outrageously burned, without being able to give due notice.

b. Hot drinks, such as tea or coffee, are of incalculable value in initial stages of shock, and should never be neglected. Hot enemas, where possible, should be used, and repeated. If the surgeon uses alcohol as a stimulant his attention is directed to two facts: 1st, the amount and duration of relief bears a direct ratio to amount of alcohol used; 2d, the relief furnished by small doses of alcohol is followed shortly by depression, and large doses are frequently followed after a more prolonged period by serious, and often fatal, delayed shock. It cannot be denied, however, that alcohol in maximum doses has been known to postpone indefinitely the shock of terrible injuries.

c. The recumbent position with snug bandaging of uninjured extremities is of especial use in cases where hæmorrhage complicates shock. In simple shock these measures probably do little good, and may do some harm through overloading the visceral vessels.

d. This same observation applies to the various uses of normal salt solution, employed on the theory that the circulation needs replenishing. If the circulation is actually empty, the addition of this solution by intravenous injection or by hypodermoclysis works for good, but if the blood is simply congested in the viscera, the solution will certainly increase the column of blood already backed up behind the heart.

e. The use of hypodermic injections of strychnia, digitalis, nitro-glycerine, and other diffusible stimulants has never, in the writer's observation, been productive of any but the most doubtful or temporary and deceptive results. I cannot recollect a single case where the recovered life could justly be attributed to such medication.

f. Although we must all concede the blood-pressure raising properties of adrenalin, it must be grouped, after all, with the other diffusible stimulants, but as the very best of that type. There is abundant evidence to show that its slow and continued exhibition, combined by the Crile method with normal salt solution, has temporarily held the bridge for many lives which would doubtless otherwise have perished for the lack of a little time to readjust and renew themselves.

Recollect always that blood pressure raised by salines and diffusible stimulants rapidly subsides. Any increase in blood-pressure which does not continue over a period of one or more hours and is not accompanied by improvement in other symptoms is deceptive, because not based on physiological causes. If such deceptive temporary improvement is followed by operation disaster will most certainly result.

g. The basis of all successful treatment of shock is the opportunity for physiological rest and readjustment.

9. Evidence of continued or increasing shock should be constantly sought for and carefully weighed.[1]

The most reliable evidences of the failure to react are the following; note, however, that several are also necessarily symptoms of hæmorrhage:

a. Continued subnormal rectal temperature, 95 to 97.

b. Blood-pressure low, without permanent reactionary tendency.

c. Recurrent syncope and air-hunger, without improvement.

d. Muscular relaxation, with sweating, and cold, pale skin.

e. Mental torpor without unconsciousness; mental anxiety without outcry.

10. No formal surgical operation has any place in the list of rational measures calculated to relieve these evidences of shock, nor are we justified in undertaking any operation as an adjuvant to such measures or in the event of their failure. All surgical operations are essentially shock-producing, and if the patient survives after "thus adding shock to shock," he lives in spite of bad surgery, and not in consequence of good surgery.[2]

11. In severe shock, even the most radical should be willing to follow the rule laid down by Guthrie to "wait four to six hours till the pulse comes up and the patient commences again to feel pain, otherwise, don't operate."

[1] Crile, in Keen's Surgery Vol. I, p. 929, says our obligation to estimate correctly the vital cost in lowered blood-pressure of a given technique is perhaps one of the most difficult of surgical duties. Nor is it any easy matter to arrive at a correct opinion that shock is definitely subsiding.

[2] S. C. Plummer, in Chicago Medical Recorder, Feb., 1909.

It is the modern experience that this period of delayed reaction often extends even into the second twelve hours with a good final result if the operator has but the patience to wait that long.[1]

12. In this connection two theories seem to be corollary to, and are probably the outgrowth of, the effort to justify operations during shock. They appear to be quite as pernicious and illogical as the major proposition which gave them birth:

a. That shock is not apt to terminate in many cases until after amputation.

b. That reaction is apt to be temporary and must be taken advantage of at the earliest possible moment.

Both of these theories are purely argumentative after-thoughts, and their correctness is incapable of demonstration.

[1] Crile says anæsthesia and any operative measures are to be postponed until the patient reacts from appropriate treatment. Failure to secure general reaction certainly contra-indicates operation. Keen, Surgery, Vol. I, p. 926.

THE EVOLUTION OF THE MILITARY SURGEON[1]

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IN the preceding articles we have traced military surgery from ancient times to the present, from darkness to light, from superstition to reason, from the bondage of authority to independent thinking and acting, from blind routine practice to scientific treatment, from meddlesome surgery to conservative surgery based on a scientific foundation. After having passed in rapid review, and in a somewhat fragmentary manner, the gradual development and growth of the art and science of military surgery, from the beginning of warfare to the present wonderful age of surgical progress, it becomes necessary now to take a retrospective view of the guild which for centuries labored in the interests of the wounded and sick in war.

The evolution of the military surgeon is co-ordinate with the rise and progressive increase in the attainments of the surgeon in civil life. Military surgeons, in the past, have contributed their liberal share to the progress and advancement of general surgery, and have always been eager and anxious to apply in their special work the newest and the best from the common fund of knowledge, stored up by the progressive members of the medical profession. The fluctuations in the advances and retrogressions of general surgery have always been the surest indications of the rise and decline of military surgery. The professional and social ascendancy of the military surgeon has been contemporaneous with that of his colleagues in civil life. We have become familiar with the menial duties and low social and non-military standing of the ancient surgeons who accompanied armies. Many of them belonged to the barber's trade; and besides doing duty as privates in the ranks and attending to the wounded, they were often compelled to attend to the comforts of their officers and serve them as ordinary barbers. They had no rank and received beggarly pay. England was one of the first countries to recognize the necessity of a regular medical service in the army and to respect medical officers. The present form of the medical service of the British army dates back to the fourteenth century. The historical development of the medical department shows that it was, from a very remote time, an integral part of the army. As early as 1680 appeared the name "Chirurgeon" in the army list, who at that time were attached to regiments, and in 1685 mention is made of a surgeon-general. Under William III., the Irish army had a Physician-General, Sir Patrick Dun, and his successor in office was Sir Thomas Molyneuse, who was a member of the Committee to Examine Surgeons for the Service. In 1716, Sir Hans Strane was

[1] Editor's Note: This is a concluding article of a series upon Military Surgery written by the late Prof. Senn for Surgery, Gynecology and Obstetrics. The other articles have appeared in previous numbers.

the Physician-General of the forces, and later was elected president of the College of Surgeons. In 1747, George II, appointed him besides Apothecary-General. At this time the medical service was already well organized, including well-equipped field hospitals, which, according to a treaty between England and France, were declared neutral, and were respected as such. In 1745, medical examination of recruits first came into force.

In 1751, for the first time, the surgeons were permitted to wear the uniforms of the troops to which they were attached. The heads of the Medical Department of London were a physician-general and a surgeon-general. In the year 1783, a law was enacted which prohibited the sale of positions of surgeons, but this abuse was continued for a long time afterward. No special certificate of qualifications was exacted to enter the surgical service of the army. On the other hand, the physicians were educated men, and were looked upon as the elité of the medical profession. In England, as elsewhere, the greatest obstacle to progress in military medicine and surgery was the strict separation of these two branches of the healing art. This evil was recognized by Paracelsus, who called the surgeons "Folterhansen," and insisted that a medical officer should be a physician as well as a surgeon when he said, "Lernts beyde oder lass bleiben." The broad chasm in the social and professional standing, between physicians and surgeons, in the army of England and elsewhere, can be readily understood when we remember that the surgeons were barbers, with little or no knowledge of medicine and surgery, while the physicians were well-educated men and graduates in medicine. Since 1787, the title of Surgeon-Major, Deputy Surgeon-General, came into use in England. The latter rank was held by John Hunter, the erudite scholar and famous surgeon, who introduced a system of promotion in the medical service. After his death the office of Surgeon-General was abolished, and was replaced by a Commission, composed of the Surgeon-General, Physician-General, and an Inspector-General of regimental infirmaries. In 1808, this Commission was constituted by a Director-General and Principal Inspectors. After the peace of 1815, these inspectors are no longer mentioned. Dr. Jackson, who was appointed by the Duke of York, Physician of all the Forces, demanded military honors and decorations for his officers. He said that such titles were irrelevant to scientific men, but that the common soldier would obey the medical officers better if they possessed rank in the army. In 1802, recruit physicians, so-called. district surgeons, were introduced. The Crimean War demonstrated the inefficiency of the Medical Department, more especially the lack of litter-bearers and orderlies, and the necessary steps were taken to make better provisions for the transportation and care of the sick and wounded. In 1860, the Army Medical School at Fort Pitt at Chatham was opened, and since that time excellent provisions have been made for the education and training of medical officers. Since 1878, the organization of the medical officers of the army is known as the Royal Army Medical Corps, with distinctive uniforms for that branch of the service, and with the respective titles, Surgeon-Major-General, Surgeon-Colonel, Surgeon-Major, Surgeon-Captain, and Surgeon-Lieutenant.

On the continent of Europe, during the Middle Ages, the most prominent and influential military surgeons were Ambroise Paré, Hans von Gersdorf, and Hieronymus Braunschweig. These men, by their zeal and industry, contributed much toward the advancement of military surgery, and were not only willing but anxious to give the results of their experience for the benefit of the whole profession and the welfare of the sick and wounded soldiers. These men were the shining lights during the fifteenth and sixteenth centuries. After them surgery retrograded, a condition largely attributable to the unfortunate affairs created by the ravages of the Thirty Years' war. As I have already stated, the constant and often bitter friction between physicians and surgeons is responsible for many drawbacks in the progress not only of military, but also of general medicine and surgery. This unfortunate division dates back to the time of Celsus and Galen, and existed for centuries. During the Middle Ages, surgeons were despised by physicians, for reasons that I have already enumerated; young men of the better classes

had no desire to become surgeons. Voitus, a distinguished surgeon of this time, insisted that surgeons and physicians should acquire knowledge of the entire healing art, and then practice in their proper field. The teaching of surgery at that time was at a low ebb in Germany, and many of the young physicians went either to England or France, to complete their medical education by attending the surgical clinics. It is said that A. von Hueter taught surgery in Göttingen for seventeen years without performing a single operation.

In England surgery always has been, at least, on a level with medicine. In Germany the reunion between surgery and medicine was effected in 1724, by the establishment of the Collegium Medico-Chirurgicum in Berlin, under William I., for the education of medical officers and country practitioners. The physician remained for a long time and ranked the surgeon in civil and military practice. As late as 1726, when the Charité was opened for the education of military surgeons, all capital operations were supervised by a physician. The graduates went abroad for two years to perfect themselves in surgery, if they intended to follow a surgical career. The low medical personnel of the army was composed of barbers, who had the grade of a tambour, and only from 1779 that of a sergeant; and each of them had to expect a whipping every time one of his grenadier patients died under his care. Under William II., the development of military medicine progressed rapidly and resulted in the organization of field hospitals and the establishment of the new military institute, called the Pepinière, in which medical students are educated and trained for the military service. The real improvements in the sanitary service of the Prussian army only commenced in 1859, in consequence of the rapid development of military medical science and the special education of physicians for military service. The organization of the German Sanitary Corps was effected February 6, 1873, and from that date the surgeons were made an integral part of the army, with a Surgeon-General at the head of the Sanitary Department, who after twenty-five years of service is entitled to a gold medal. The social standing of the medical officers was improved in 1868, and has steadily risen since. The war with France, with its attendant great loss of life, has contributed much to increase the estimation for medical officers by the government and commanders of the army.

In Austria, a beginning in the improvement of the military medical service was made in 1775, when the Empress established in the hospital at Gumpendorf a school where military surgeons were taught the treatment of internal diseases and therapeutics. But Austria had no scientific military medical organization until 1786, as up to that time it was deemed superfluous for a military surgeon to have any knowledge of anatomy and medicine, and real reforms were delayed until the reign of Josef II. In France early efforts were made to improve the medical service of the army, with such famous surgeons like Ambroise Paré and Baron Larrey at the head of the movement, who by their teachings and example inspired the government and the army with the importance and value of an efficient medical service. Under the reign of Henry IV., acting on the recommendation of Paré, permanent military hospitals were erected. Under Louis XII., a regular ambulance service was established and each regiment was given a Major-Surgeon. Louis XV. and XVI. built special schools of instruction for military surgeons at Besancon and Lille. Barons Percy and Larrey, the famous military surgeon of the Napoleonic wars, were distinguished by their scientific contributions and organizing talent. The classical work on gunshot wounds by Percy received the prize of the Royal Academy of Surgery of Paris, and was translated into German and Italian. It was Percy who said: "Je vais, dans les loisirs d'une paix, hélas! trop incertaine, préparer, sije puis de nouveaux, secours aux guerriers."

Baron Larrey's energy on the battle-field has never been equaled, and his genius of organization has never been surpassed. His flying ambulance corps and mounted surgeons often passed through rains of bullets in bringing prompt aid to the wounded. No wonder that under such leadership the medical service of the French army stood higher in the estimation of the government and commanding officers,

and was more efficient, than that of any other country. It would be time lost if I should follow the development of the medical organization of other countries besides those I have referred to, because they would be largely repetitions of what has been stated. Our country, being one of the newest of military nations, has had the advantage of the experience of the past, after which it could model the organization of the medical department of our army. New nations have profited by the experiences of the past, and can organize the medical service of their armies on plans which it required the old countries centuries to develop. This is best shown by what was accomplished by the Japanese medical officers during the late Russo-Japanese war. There is no country in the world which has more respect and esteem for its military surgeons than Japan; and I do not go too far when I make the statement that the medical corps of the Japanese army is the best in the world. It is an organization in itself, unhampered by superior influences and political favoritism. The work accomplished by the medical department of the Japanese army, during this war, has astounded the world; and we must look to this new nation for the best improvements in the medical service. The medical department of our army will never be what it should be until it has become emancipated from the political and other influences of the office of the Secretary of War, and becomes a separate branch of the service of the army, with a surgeon with the rank of a Major-General at its head. Recent wars have demonstrated more clearly than ever before the great importance and the inestimable value of an efficient medical service; and the time has come when enlightened governments must encourage and foster this branch of the military service.

INSTRUMENTS AND EQUIPMENTS

The artisan is known by the implements which he employs, and the expert takes great pains in making his selection. The manual work of the ancient military surgeons was largely a mechanical performance, with no definite ideas of the material he was working upon. All of the ancient surgical instruments were noted for their large size and clumsiness. In their construction, artistic designs engaged more the attention of the inventor and manufacturer than the ideas as to their utility. Certain instruments, used for the extraction of arrows and bolts, such as knives, scissors, forceps, and probes, dilators, hooks, and the Diocles tube, were in use long after the surgeons had to deal with gunshot wounds. Gangrene, which so often followed grave gunshot wounds, made it necessary to invent additional instruments with which to perform amputation. The amputating knives, first employed, came nearer resembling a sickle than a surgical instrument, and the saws, those of a carpenter rather than the instrument of a surgeon. The forceps were gradually changed to answer the new purpose by fenestrating the grasping ends of the blades. The probe was the constant companion of the surgeon; and it was thought that this instrument had reached perfection when Nélaton attached to one end a porcelain point which, when rubbed against the bullet, would show the stain of lead on its surface, demonstrating that the probe had touched the bullet and not a splinter of bone or some other rough surface.

During the Civil War, Nélaton's probe was not always at hand, and an ingenious surgeon of the Federal army extemporized one by attaching to one end of an ordinary probe a piece of the stem of a clay pipe, which answered the same purpose. With the progress of military surgery, much ingenuity was expended in the improvement of the old surgical instruments and in the invention of new ones. The cruel cautery-irons had to yield finally to the ligature. Instruments had to be invented to facilitate ligation, and Assalini's tenaculum and different kinds of artery-forceps came into use.

The Spanish windlass and Petit's tourniquet became a part of the surgeon's outfit in controlling hemorrhage during amputation. Instruments for cupping and bleeding, with which to prevent or counteract inflammation, became a necessary part of the surgeon's outfit. The expansion of operative work required new instruments; and in the course of time the surgeon's instrumentarium became a bulky and heavy one. That these instruments, handled and prepared as they were at that time, carried from field to field, from ward to ward, from

hospital to hospital, and from patient to patient, often became the carriers of infection, requires no stretch of the imagination. Here are the directions given by Hennen (Principles of Military Surgery, etc., 1829), how to take care of the instruments: "To keep his instruments in perfect and serviceable order must be the wish of every surgeon. Some wrap them in lint, or bibulous paper; some dust them with absorbent powders, as starch or magnesia; others smear them with mercurial ointment; and some with simple oil, as fresh as they can procure it. The latter, carefully applied, and afterwards gently rubbed off, I prefer to all other modes; but whatever precaution is adopted, the instruments should be frequently examined, and the case covered with patent leather, or some other waterproof substance, the whole loading of the baggage animal carefully secured with painted canvas."

There are many surgeons of the Civil War, now living, who must remember with horror the filthy, velvet-lined instrument cases which they carried through the campaign without a thought of their contents being the carriers of erysipelas, hospital gangrene, and suppurative infection. The radical change in the manufacture of surgical instruments and their proper care came with the new era in surgery — the teachings of the immortal Lister. General anæsthesia, elastic constriction, the great variety of hæmostatic forceps, and the absorbable animal ligature have shorn the major operations of all their former horrors; as by these means the operations can be performed painlessly and without any considerable loss of blood. The perfect methods of hæmostasis and aseptic precautions have extended the field of operative surgery into territories far beyond the limits dreamed of by surgeons less than a century ago. Much of the success of operative surgery of recent years is due to the manufacture of elegant and delicate instruments, specially adapted for the work for which they are intended. The surgeon of to-day, who reads the directions given by Akins, in his "Naval Surgeon," what the medical officer should do in the way of making preparations for an impending battle at sea, would be inclined to regard with pity his colleagues of that time, and much more so the wounded they were called upon to treat. "In war, the surgeon always should have Boxes of Dressings ready, and Dossils, in sorts, a Great Number, Rowlers, Compress, Bandages, Ferulæ, Laminæ, of different size; and when the Ship is preparing for Battle, to army our Needles, to lay the Apparatus for Amputation in Order."

This feeling of pity, will be sure to increase when a little further on he reads his directions for the ligation of arteries after amputation.

"First, a loosening of the Turniket being made, and the Artery discovered by its Impetus, you immediately lay hold of it with a Spring-Forceps, and having the Arterial Needle ready, armed with double silk and waxed, you are to pass round, taking up a small Circle of Flesh nigh the mouth of the Artery, then comprehending a very small Linnen Compress between that and the Tie, you make fast with a close double knot."

PLASTIC FIXATION DRESSINGS

Although some of the ancient military surgeons were opposed to immediate fixation of gunshot fractures, most of them recognized the necessity of securing for the limb a condition of rest by some kind of a mechanical support. The necessity of treating such fractures in the same mechanical manner as simple fractures is emphasized by a number of the most prominent of the older writers on military surgery. Baron Larrey was the first military surgeon who advocated plaster splints in the treatment of gunshot fractures. During the campaign of 1798-99, in Egypt, he saw this method practiced first by the Egyptians and Arabs, and described it later as the *appareil inamovible*. He used it in cases of fracture of the leg, for the purpose of allowing his patient to leave the bed as soon as possible after being wounded. The apparatus was very cumbersome, requiring the use of a stirrup, bandage with eight heads, a small square dressing-cloth, a large triangular bandage, straw pillow, and straw splints. The fixation material was composed of a mixture of spirits of camphor, lead-water, and albumin of egg.

Larrey made extensive use of this primitive fixation dressing in the military hospitals. This treatment was strongly objected to by civil surgeons; among them the most out-

spoken was Rognetta. Neither Larrey nor later his son were able to popularize this method of treatment. Seutin, professor of surgery in Brussels, introduced starch as a fixation material and simplified the Egyptian idea. To secure the necessary extension in the treatment of fractures of the leg *in ambulando*, he made patients wear a shoe with a high heel on the opposite side. It was soon found that the starch dressing had its disadvantages in civil practice, and much more so in military practice, as the starch had to be boiled fresh every time, and it required at least forty-eight hours for the dressing to become hard and firm. Schmitz, of St. Petersburg, used silicate of soda (water-glass) as a fixation material, saturating with it felt splints, which were moulded to the parts. These splints immobilize the whole extremity. The length of time required for the material to set was the greatest objection to its general use; and for that reason it has never been employed to any extent in military practice.

Plaster of Paris was first suggested as a fixation material by Matthysen, of Holland, but was violently objected to by Seutin. The claim of Matthysen was warmly supported by Szymanowsky; and Pirogoff made extensive use of it during the Crimean War, and ever since that time it has been in use almost exclusively as a fixation material in military practice. The immobilization of gunshot fractures by plaster-of-Paris dressing, circular or in the form of splints, is now the treatment approved by the best authorities on military surgery. I have found the incorporation of strips of wire netting in the plaster-of-Paris dressing of the greatest utility in strengthening the splints and increasing their durability.

OLD FIELD MEDICINE-CHESTS

As the old military surgeons were not expected to know anything about the action of medicines and the treatment of internal diseases, they were not encumbered by medicine-chests. The physicians of early times did not carry with them into the field a large variety of drugs. During the Thirty Years' War Ernst I., of Saxony-Gotha, supplied each regiment of his army with a field medicine-case, devised by his chief surgeon, Ludwig. It contained 27 remedies and weighed 50 pounds. Some of these drugs were carried in quantities of twelve hundred to sixteen hundred doses. It contained, among other things, jalap powder, sulphate of copper, senna, cream of tartar, animony, sulphur, saltpetre, mostly drugs in solid form. Theriak was excluded. Ludwig, at the request of the Prince, wrote a little book on first aid for the use of the surgeons.

Some strange practices were indulged in at that time, and were recommended in Ludwig's book. For tonsillitis a piece of swallow's nest, boiled, was applied to the neck, or a dried toad was tied around the neck. Hemorrhage was arrested by appyling to the wound moss taken from exposed human skulls or bones lying about in cemeteries. Gunshot and other wounds were covered with a cloth moistened with the patient's urine, and urine was prescribed as a gargle for sore throat. As a prophylactic against the Pest, a hazelnut shell, filled with quicksilver, was worn on the neck.

The field outfit for the treatment of internal diseases was improved on from the time surgeons were in sole charge of the sick and wounded. The heavy chests, filled with bottles containing fluid preparations, have fortunately disappeared, since chemists have supplied us with their elegant preparations in the form of granules, pills, and tablets. The field surgeon now can carry all the drugs he will need in a case which he can carry conveniently in his vest pocket. Modern pharmacy has done much for military surgery by the reduction in the size and weight of the field medicine-chest, in substituting the concentrated and more reliable alkaloids for the fluid preparations.

MILITARY SANITATION AND HYGIENE

The greatest triumph military surgery has attained during the last quarter of a century is the present state of sanitation and hygiene. In all great wars of the past, disease has claimed more victims than the weapons. During all long wars, disease has followed the armies with a never-failing regularity, until the Japanese so recently demonstrated to the world that disease, the greatest scourge of armies when engaged in a prolonged war, can be pre-

vented to a large extent by the timely exercise of sanitary precautions and hygienic measures. The Japanese military surgeons have shown that preventable disease can be prevented, in the field as well as in private practice, by enforcing rigid sanitary and hygienic regulations.

For the accomplishment of such an important matter, a thorough knowledge of sanitation and hygiene, on the part of the medical officers, is the essential prerequisite; and prompt action and rigid discipline are necessary in preventing the origin and spread of contagious and infectious disease. Heretofore, no large army serving in the field for any length of time, more especially when in winter quarters, escaped typhoid fever, malaria, camp diarrhea, smallpox, measles, dysentery, and in the distant past, pest and scurvy. One of the special requirements of a military surgeon in the future will be a thorough knowledge of preventive medicine. This part of military medical science has been of slow growth, and it was not until now that governments and commanding officers have recognized its importance. Let us take a brief retrospective view of this side of the evolution of military surgery.

Military sanitation was first discussed by I. A. à Gehema, in a book with the title, "Wohlversehener Feld Medikus," Hamburg, 1684. A little book by Raimund Minderer [1], published at Augsburg, 1620, antedates this one, but it contains very little on the prevention of infectious diseases. It recommends shaving as a sanitary precaution, and gives directions how to destroy insects, to cure corns, and to prevent chafing in riding. It directs surgeons to have two bottles strapped to the saddle, one containing vinegar and the other whiskey: the former to be used against heat, the latter against cold. He advises that the hair obtained by combing the horses should be saved and used in lining the inside of the boots of the soldiers. He directs that the tents should be pitched as far away as possible from marshy places, and that the fly should face the east. Impure water is to be made safe by throwing a heated stone into a basinful of water or by boiling. He warned the soldiers to abstain from drinking water when heated. Finally, he enjoins surgeons to treat the soldiers with the utmost care and gentleness, and insists that the field physicians inspect the surgeon's outfit every month and assist him in every way to the best of their ability. Purmann wrote in the same vein at the end of the seventeenth century.

One of the very best of the older works on military sanitation is Baron Pringle's "Observations on the Diseases of the Army," 1752; German translation by Dr. A. E. Brande, 1772. Pringle was the surgeon-general of the British army during the war in Belgium, between England and France. He took extensive notes, during the different campaigns, on the prevalence of malaria, dysentery, hospital and prison fever, and the conditions under which these diseases developed. He deplored that so many opportunities had been lost in the past to enrich military medicine, owing to neglect of physicians to make accurate observations. He made many experiments on putrefaction, and was on the very verge of the discoveries made later by Pasteur. He speaks of antiseptics and their value in preventing putrefaction. He used in his experiments cinchona bark, saltpetre, tartaric acid, ammonia, sea-salt, serpentaria, myrrh, camphor, etc., and tested their efficiency in preventing putrefaction of meat, blood-serum, yolk of egg, and bile. As agents which favor putrefaction, he makes special mention of heat, moisture, and close air. His treatment of fever was rational, as he opposed bleeding and debilitating medi cation, and relied largely on supporting and eliminating remedies.

Another excellent book on military sanitation, which was the text-book of our surgeons during the war with England, was written by Baron van Swieten during the latter part of the eighteenth century.[2] Van Swieten attributes the diseases so common in armes, at least in part to the fact that the unseasoned soldiers, coming from private life, in entering the army become melancholy; and for this reason he recommends all kinds of amusements and diversions. He advises the use of vegetables and ripe fruits for the prevention and cure of scurvy. He lays great stress on pure water, as an element in the prevention of disease. If

[1] "Medicina Militaris, und Gemaine Handstücklein zur Krieg-Artzney Gehörig."

[2] The Diseases Incident to Armies, with the Method of Cure. Translated from the original of Baron van Swieten. Philadelphia, 1776.

pure water is out of reach, the best available should be obtained.

In making the examination of drinking water, he gives the following test: "There is an easy way to distinguish water that is pure from that which is less so, by means of *Oleum tartari per deliquium.* If you let fall a few drops of this in a glass of water, if not pure, it becomes instantly thick and milky, whilst the same operation produces only a cloud in that which is more pure." River water should not be drawn near the banks; that which is in the middle of the stream is always the best. If pure water cannot be obtained, mix six ounces of vinegar with three quarts of water, which will render the water more agreeable. Drinking water is also improved by steeping in it some pieces of the root of *calamus aromaticus.*

The soldier ought to be well clothed and covered. Camps ought to be pitched on a dry spot as much as possible. It is advisable to avoid the neighborhood ot thick forests; they prevent the wind from penetrating and render the air of the neighboring places damp and close. If damp grounds cannot be avoided, the soldiers must have their straw changed oftener than usual. In times of rain, the tighter the tents are extended, the less it penetrates. Small trenches dug round the tents, contribute to the dryness of the spot where the soldier lies. If an army remains long in the same camp, the unwholesome effluvia from so many bodies always occasions sickness, unless there happen to be violent and frequent winds. Hot climate and moist air aggravate this condition. The camping places should, therefore, be changed frequently.

Nothing is more harmful to the soldier, when heated with work, than to strip, expose himself to the cool air, and greedily drink cold water. The soldier should be protected against unnecessary exposure to great heat. Cleanliness cannot be too much insisted upon. Overcrowding of soldiers in tents and garrisons must be stringently avoided, as it is detrimental to their health. Good ventilation is of paramount importance, as well as wholesome food.

Considering the time when Pringle and van Swieten lived, worked, and taught, their views on military sanitation were admirable. Many of their recommendations have stood the test of experience and remain sound to-day. Present military sanitation and hygiene have become enlightened by the new science of bacteriology, and a better knowledge of vital processes; both the fruits of modern research and scientific experimentation. Military sanitation has now a permanent scientific foundation, upon which will be built the temple of preventive medicine, in the construction of which all civilized nations will furnish their respective share of material and labor, and with its completion the evolution of the military surgeon will have attained perfection.

DERMOID CYST OF THE KIDNEY

By WILLIAM S. GOLDSMITH, M. D., Atlanta, Georgia

THE rare occurrence of dermoid tumors of the kidney is shown by the fact that only two cases have been reported up to this time, one by Paget in 1853 and the other by Haeckle in 1902.

The specimen, aside from its surgical importance, must be of unusual pathological interest on account of the curious embryonal development. Clinically, the symptoms were those of a solid tumor of the kidney, probably the malignant type, as it was of slow growth and associated the three cardinal points of malignancy: hæmaturia, pain, and tumor.

Briefly, the history was as follows:

Male, age 20, family history negative.

At two years of age suffered with pain, directed to the right lumbar region, and at intervals of two or three years was treated for "kidney complaint." When sixteen years old, he experienced the beginning of a dull pain in the right side, which progressively increased until two years ago, when the pressure and pain radius was compared to that of a heavy watch lying in the abdomen. Four years ago attacks of colic, followed

Dermoid Cyst of Kidney

by a slight hæmaturia, developed. These attacks confined him to the house for twenty-four hours, and were relieved by hypodermics of morphia. Recurrences occurred two or three months apart, and for the past two years were characterized by the appearance of a solid tumor, which presented in the right lumbar region.

Hæmaturia and great pain were always accompanying features and the disappearance of the outline of the tumor was frequently followed by a cessation of the pain.

Having witnessed an attack three days before the operation, when the tumor was most manifest, I was convinced that these symptoms were due to a twisted ureter, since the return of the kidney to its normal position practically obliterated the tumor outline. Twenty-four collections of urine showed insignificant deviations from the normal quantity, and microscopical and chemical examinations were negative, except for red blood cells.

The patient's weight was normal and general condition good, and an exploratory operation was advised. The lumbar incision was made which exposed a large semisolid tumor of the upper pole of the kidney. Efforts to deliver the kidney resulted in a rupture of the tumor, and a quantity of red, granular material was scooped out with the fingers.

Nephrectomy was quickly performed, and recovery was prompt and uneventful. Patient is entirely well. The specimen was submitted to Dr. J. E. Paullin, of the Carnegie Laboratory of Pathology of the Atlanta College of Physicians and Surgeons, who pronounced it to be a dermoid cyst.

PATHOLOGICAL REPORT

The specimen consists of a kidney measuring 14½ x 8 x 4 cm. The surface of the kidney is everywhere quite smooth. The capsule strips away easily leaving a smooth, regular surface. On the upper pole of the kidney there is a mass measuring 7½ x 8 x 5 cm. This mass is covered externally by a thin layer of fibrous tissue resembling very much the capsule of the kidney. The mass itself is larger than that portion of the kidney substance which remains. Definite fluctuation is present. On section a large quantity of dark reddish, thick, mealy material exudes which is more or less matted together by hair. The lining of this cyst is quite irregular, coarse and granular, and growing from the inner surface one finds numerous long, whitish hairs. In the cyst contents escaping a tooth is found. This measures 3 x 4 mm.

The cyst wall measures from 1 to 3 mm. in thickness, and has a dark, whitish appearance, being quite tough. No definite mucous membrane can be seen lining this wall on its inner side. In one place it would seem that this cyst communicates with the pelvis of the kidney by a very small opening which measures 2 mm. in diameter. This, however, cannot be definitely determined because at this particular place the kidney has been sectioned.

The cut surface of the kidney shows the cortex to measure about 4 mm. in thickness. The malpighian bodies stand out quite distinctly. The pyramids appear apparently normal. The pelvis of the kidney shows a slight thickening, and in places there is a definite fibrinous exudate covering the mucosa. In places there are small hæmorrhages beneath the mucosa.

For microscopical examination sections were taken from the kidney substance,— the wall of the cyst, pelvis of the kidney, and a portion of the contents of the cyst.

Sections of the kidney show the capsule to be about normal in thickness, and there is no perceptible increase in connective tissue lying between the capsule and the parenchyma of the organ. The malpighian bodies are about normal in size and shape,— the tuft, however, contains quite a number of red blood cells, and in places outside of the tuft between this and Bowman's capsule there is a finely granular hyaline material taking the eosin stain. The cells lining the convoluted tubules, as a rule, are swollen and fill the lumen. Many of the uriniferous and collecting tubules are dilated and contain finely granular coagulated material. There is no marked infiltration of the tissue between the tubules with either connective tissue nor small, round cells. The blood-vessels contain quite a few red blood cells, but there is apparently no extravasation of the cells into the surrounding tissue.

Section of the cyst wall shows that it is composed of a well defined connective tissue. Growing from its surface one observes numerous hairs; and in one portion of the section squamous epithelial lining is evident. The wall is everywhere infiltrated with numerous small, round cells.

Section of the cyst content shows that it is made up of a material which in places has the structure of myxomatous tissue. The cells forming this granular tissue are columnar cells with the nuclei placed toward the base of the cell with an even staining protoplasm. In other places one finds a tissue which resembles very much the collecting tubules seen in the normal kidney. There are quite a few red blood cells scattered among these glandular structures. Numbers of small, round cells are everywhere infiltrating the structure. Certain portions of it are composed altogether of a pink staining, finely granular material showing no nuclei. Occasionally one sees cross and longitudinal sections of hairs scattered about through this mass.

The pelvis of the kidney shows everywhere very marked small, round cell infiltration with here and there over the surface of the mucosa a small amount of fibrinous material in the meshes of which there are a few red blood cells. There is apparently no destruction of the epithelial lying beneath this exudate.

Diagnosis: Dermoid cyst of the kidney. Parenchymatous nephritis (slight). Catarrhal pyelitis (slight).

THE PRESENT STATUS OF ETHYL CHLORIDE AS A GENERAL ANÆSTHETIC[1]

With a Report of 1,880 Cases

By W. WEBSTER, M. D., C. M.
Anæsthetist at the General Hospital Winnipeg

ETHYL chloride has now been in constantly increasing use by myself and in the General Hospital for nearly four years. As we have now had 1,880[2] administrations it occurred to me that a résumé of these cases up to the end of 1908 would not be without interest to the members of this society.

On examining the records of these cases I find that 1,393 were administered before ether, chloroform, or A. C. E. mixture, and 487 were given for short operations at which no other anæsthetic was used. The bulk of these latter cases have occurred during the last year; a little diffidence, which is quite natural in the case of the use of a new anæsthetic, having previously been shown regarding its use by some of those engaged in operative work. The operations for which this anæsthetic has been used alone are those of tonsillotomy, or that operation with adenoids, opening abscesses, removing finger or toe nails, extraction of teeth, resection of ribs for empyema, iridectomy, injection of tubercular hip joints, etc., which operations show that it has a fairly large field of usefulness. The dose was generally 5 c.c., but in some rather prolonged cases amounted to 15 c.c. or even 20 c.c.

In this series of cases we have met with no fatalities, though on three occasions artificial respiration has had to be used for a few moments. The cases in which artificial respiration has been required were all operations for the removal of tonsils and adenoids, and in at least one instance a blood clot had formed over the larynx and was not wiped away with sufficient promptitude. Some of the cases, notably the empyema cases, have been in such extremely bad condition that one would have hesitated to use either ether or chloroform. I am aware, however, that our series of cases is too few to enable us to draw any important deductions as to the relative safety of this anæsthetic, and for this I shall be obliged to refer to other statistics.

The advantages over less volatile anæsthetics are well marked in the rapid induction and recovery periods, by which a great saving of time is effected on the part of the anæsthetist and operator, especially when a number of short operations have to be performed consecutively. The comfort to the patient of losing consciousness in a period which is estimated in seconds instead of minutes as required by less volatile anæsthetics, together with the less disagreeable and irritating odor of the drug, are also points not to be lost sight of.

This anæsthetic has been used at all ages, from children of 24 hours to adults of over 80 years of age.

The method of administration varies. That described as the closed system, in which rebreathing takes place into a bag inhaler, being the one finally adopted, and which is that generally used in Great Britain. On the Continent of Europe and in some hospitals of Great Britain and the United States a more open method is used, the drug being sprayed on a mask covered by a number of layers of gauze, variously mentioned by different anæsthetists as 4 to 12, until the patient loses consciousness. This, and the more or less open methods, have the disadvantage of prolonging the induction period until it becomes a matter of two to four minutes, and thus one of the advantages of the anæsthetic is neutralized. The exponents of this method, however, claim that a greater safety is obtained, as the various stages of anæsthesia can be better followed than when a rapid induction compresses the different stages into fifty or sixty seconds or less, making it almost impossible to differentiate them. It is very problematical whether there is anything prac-

[1] Read before the Winnipeg Medico-Chirugical Society, January 7, 1909.

tical to be derived from this slow method of induction, while it seems reasonable to suppose that the patient gets, on the whole, a larger dose of the drug, which is certainly a disadvantage, as being more likely to promote vomiting and other disagreeable after effects.

The dose used to induce anæsthesia is usually 3 c.c. for children and 5 c.c. for adults, when given in a closed inhaler. This dose gives an anæsthesia varying from 50 seconds to 2½ minutes; but even after this there is often an analgesic condition of the patient which permits of the operation being continued, sometimes for as long as five minutes. Where a longer anæsthesia is desirable, further doses may be given or a more or less continuous spray kept up; in this way operations of an hour or more in duration have been performed. It is very questionable, however, whether this anæsthetic has any advantage over such a safe anæsthetic as ether, in prolonged operations. From my own experience I prefer ether when the operation is of sufficient duration to necessitate the use of more than 5 or 10 c.c. of the drug. Its chief utility appears to me to be in obtaining anæsthesia before the use of such anæsthetics as ether or chloroform, and for short operations. In this way it fills a gap in the armamentarium of the anæsthetist between the light and brief anæsthesia of nitrous oxide, and the deep narcosis of chloroform and ether.

Owing, I presume, to the bright flush which usually spreads over the face of patients under this anæsthetic, numerous writers mention that the blood pressure is raised. This is certainly a fallacy, Cole,[1] Embley,[2] and myself[3] having shown in numerous experiments that the blood pressure invariably falls with an anæsthetic dose, although there is sometimes a very slight preliminary rise for a few seconds before the fall commences; with a more dilute vapor it is unchanged. Embley[4] also showed that, like chloroform and in contrast with ether, it produces a paralytic effect on heart muscle; the quantity of ethyl chloride vapor, however, required to produce this effect was nineteen times as great as that of chloroform vapor.

The rate of heart beat is at first decreased and the excursion lessened, but as the blood pressure rises on elimination of the drug, the heart beats become more rapid. Embley[5] showed that by vertical rotation of an animal with the head up, under deep ethyl chloride anæsthesia, the blood pressure was lowered considerably, though much less than with chloroform; the paralysis of the vasomotor mechanism being apparently much less profound than with a corresponding depth of chloroform anæsthesia. This is of considerable practical importance, as some operators prefer the sitting to the recumbent position for operations about the mouth, and in many English hospitals this anæsthetic is constantly used for such operations with the patient in the sitting posture. I have myself administered it a number of times in this position without any troublesome effects, though, on general principles, I always prefer the recumbent position when using a general anæsthetic. When the sitting position is used, the head should be erect on the spine and not thrown back with the trachea on the stretch, as this interferes with free respiration; besides which the blood, saliva, etc., gravitate towards the back of the mouth and are swallowed or inhaled, in the former case giving rise to vomiting, and in the latter, to laryngeal spasm. If, on the other hand, the head is tilted too far forward, the chin may press on the trachea and so cause respiratory embarrassment.

Safety is undoubtedly the first consideration in the use of any anæsthetic, and though ethyl chloride was first used in 1846 it did not come into general use until the last decade. A committee of the British Medical Association reported unfavorably upon its employment as recently as 1880. Since its revival, however, in 1896, it has gradually worked its way into favor till it now occupies a position of considerable prominence in the anæsthetic world.

The death rate has been variously estimated, but is usually placed at 1 to 10,000. McCardie records 12,000 cases with four deaths, an average of 1 to 3,000, which he collected in the Birmingham district. Luke[6] cites a list of 24 fatalities occurring between 1900 and 1906, and a considerable number have since been reported. This anæsthetic therefore occupies a position between chloroform and ether in point of safety, and it is only courting

disaster to act on the assumption that it is almost absolutely safe, as some have stated. It is certainly far less safe than nitrous oxide, but has so many advantages over this anæsthetic, such as portability, being less disagreeable to inhale, and longer duration of anæsthesia, that these far outweigh its disadvantages.

A large number of inhalers, more or less complicated and useful, have been invented for the administration of ethyl chloride. On the whole I have found Ormsby's ether inhaler as efficient as any; while being perfectly simple there is nothing to get out of adjustment as in the more complicated ones. A capsule containing the drug is broken, the contents being allowed to spray into the bag of the inhaler; the sponge is put into place, and the inhaler applied closely to the face. Unless this is done quickly, so volatile is the anæsthetic that a portion is lost, sufficient often not remaining to induce anæsthesia. Or, the capsule may be dropped into the bag of the inhaler and broken there with the hand outside the bag.

Most ethyl chloride inhalers are intended to be applied to the face before the capsule is broken. This enables one to obtain regular breathing and to secure the patient's confidence; but the breaking of the capsule in the confined space it then occupies makes an explosive sound sufficient to startle the patient, especially if of a very nervous temperament, and in fact has proved so disagreeable that personally I have abandoned this method, in spite of its obvious advantages.

The after effects are not so severe as with chloroform and ether, the drug being eliminated rapidly. They vary with different patients, with the quantity of drug used, and the amount of rebreathing. With short administrations, vomiting occurs once in seven or eight cases. Sometimes there is headache; this is more apt to occur when the patient is allowed to move soon after the return of consciousness, than if kept in the recumbent posture for half an hour after the operation. Another important point is to have the patient prepared as for any general anæsthetic, with the stomach empty, etc.; although this is not so imperative as in the case of ether or chloroform anæsthesia.

If the administration is conducted by means of a closed inhaler, the breathing quickly becomes deeper and more rapid, this affords a valuable guide to the stage of anæsthesia. A little later, vibratory movements of the larynx are felt by the finger under the chin, which in a few moments deepen until the characteristic laryngeal stertor is established. About the same time that the breathing deepens the patient's color improves, the face becoming a healthy red. In a few cases a light perspiration breaks out over the face, but in my experience this is the exception, though some writers seem to have observed it frequently. The eyeballs are now fixed, generally in a position of convergent squint, and turned either upwards or downwards. The pupils are widely dilated and do not react to light.

When the operation is not upon the mouth it can be commenced immediately on the first sign of stertor, before the patient is as deeply anæsthetized as is described above, the inhaler being left applied to the face for a short time longer, until deep anæsthesia is established, as I have never seen any reflex act occur when a skin incision or puncture was made at this stage. This permits of a longer time for operative procedures than when the inhaler has to be removed before the surgeon can commence his work.

In about one-third of the cases one meets, there is pronounced masseteric spasm, even under deep anæsthesia. This is of no consequence if the nasal passages are clear, and in fact has never given me any trouble, except when the operation necessitated the mouth being opened. In these cases, with adults and older children I make a practice of inserting a closed gag before the induction of anæsthesia. In younger children, who would be alarmed at this procedure, I first anæsthetize and then use a boxwood wedge to open the teeth, when necessary, before inserting the gag.

In conclusion, I would reiterate the necessity for the closest watchfulness during the administration of this anæsthetic.

2. To the end of the year 1908.
1. Proc. Physiol. Soc., June 15, 1903 (Jour. of Physiol., vol. xxix, p. 25).
2. Proc. Royal Soc., B., vol. lxxviii, 1906.
3. Bio-Chemical Jour., vol. i, numbers 6 and 7.
4. Op. cit.
5. Op. cit.
6. Guide to Anæsthetics, 1906.

DEPARTMENT OF TECHNIQUE

A UNIQUE ACCIDENT TO A MECKEL'S DIVERTICULUM

By B. VAN SWERINGEN, M. D., Fort Wayne, Indiana

Inasmuch as a search of the literature at my command has disclosed no similar case, I am led to report this history and the condition found at operation.

Miss M. K., 28 years of age, called me to see her on January 31st, on account of severe abdominal pain which had developed during the night. She gave the history of an attack of pelvic inflammation in 1900 which confined her to bed two weeks and kept her out of school four weeks. During that attack most of her pain was on the right side. She had an illness about four years ago during which the complaint was confined to the right side and which lasted for several days. In the intervals she had no especial discomfort and was in her usual health when, on the night of the 30th, she developed a sudden sharp pain in the right flank which was accompanied by some nausea and vomiting. She went to her office the next day but the pain continuing she went to her room and bed.

When seen about 1 o'clock, the case presented the familiar picture of an acute appendicitis and this diagnosis was made.

There was rigidity of the right rectus and she was exquisitely sensitive over McBurney's point where a tumor mass could be made out. Her pulse was 104 and her temperature $98\frac{3}{5}$ degrees F. An immediate operation was recommended and accepted.

On opening the abdomen through the right rectus a band of adhesion was first noticed attached to the right edge of the incision. On following this down it was found attached to a cyst-like tumor about the size of a small orange which looked very dark in color. Traction on it delivered the whole mass and the opposite pole was found attached to the small bowel near the cæcum. The bowel attachment was opposite the mesentery by a pedicle about an inch in length. This pedicle was found to be twisted on itself sufficiently to obstruct the circulation, and of course the abdominal attachment was also twisted. The abdominal attachment was ligated and severed. The twist in the bowel pedicle had occurred from left to right and consisted of two complete turns. When it was untwisted it was found that the contents of the cyst which was largely gas with some fluid fæces, could be expressed into the bowel showing that the lumen was patent. In size the pedicle resembled a lead pencil, and the opening into the bowel could not have been larger that its unsharpened end. It was ligated with linen, the stump cauterized with carbolic acid and buried into the wall of the small gut just like an ordinary appendectomy.

The appendix was then removed although presenting nothing pathological except some injection of its vessels on the surface.

The uterus and tubes were closely bound down by adhesions and the left ovary presented a cyst about the size of a walnut. This ovary and the tube were freed and removed.

The only suggestion I could find of a similar condition, or a condition approximating this, is in a remark by Stengel in Osler's Practice, in which he says that a diverticulum may be the seat of a volvulus by rotating on its own axis.

Of the 184 cases collected by Porter there were eight cases of volvulus. This paper reviewed the history of all published cases four years ago.

So far as I am able to learn these cases were not like the one here reported at all.

It is conceivable that when a diverticulum which is not attached to the abdominal wall begins to rotate on its axis the twist may be communicated to the bowel itself and produce a volvulus. Or it may produce a twist in the long axis of the bowel by virtue of its own weight.

In this case we have a globular tumor attached by two poles rotating on its axis until it obstructs its own blood supply. The stem attached to the abdominal wall was not patulous.

This case is unusual also because of the fact that it occurred in a female subject. Kelynack found four Meckel's diverticula in 298 autopsies, all in male subjects, while Rolleston found ten instances in 337 cases, nine of which were in males. There were 30 females in the cases reviewed by Porter.

Then too, the average age was 21, whereas this case is 28.

The patient is recovering perfectly.

A CASE OF PRIMARY TUBERCULOSIS OF THE APPENDIX

By FRANK H. JACKSON, M. D., Houlton, Maine

The following case is reported on account of its acknowledged rarity and also to remind us that in endeavoring to account for symptoms relating to disease of the appendix that tuberculosis must be considered. As Kelly and Hurdon state, primary disease of a tubercular nature of the appendix is rare; and while it is impossible to say that some other focus can not be excluded in the case reported, the subsequent clinical course of the case warrants the assumption that it was absent. A little over one year has elapsed since operation and as the patient is in most excellent health I have recorded her as cured.

I acknowledge my indebtedness to my friend Dr. P. L. B. Ebbett, of Hodgdon Mills, Maine, for the opportunity of seeing the case and performing the operation.

Mrs. K., age 18, 0 para, housewife. F. H., father committed suicide. History of insanity on paternal side. No history of tuberculosis, maternal or paternal. P. H., patient of an extremely nervous temperament. No serious illness. Menstruation until the fall of 1907 has been regular, normal in amount, and without pain. During the past few months has had some pain which seeemingly is growing more severe at each period. Last menstruation was characterized by quite severe pain. During the summer and fall of 1907, while not sick, did not feel in her usual health. No definite symptoms, but complained of vague pains in the abdomen and some discomfort after a meal of hearty food. Her menstrual pain was in the lower right iliac region, and following menstruation there was some residual tenderness for a few days.

P. I., began about the 5th of February, 1908. Was taken with a sharp sudden pain in the epigastrium, which was referred within a short time to the right iliac region. There was extreme nausea and vomiting. Bowels were constipated and were moved, with some difficulty, by high enemata. There was a slight rise in the temperature and the pulse was increased, but not to cause any alarm. For three or four days the patient was given no food, the bowels were moved with enemata and the case carefully kept under observation. Under this treatment the nausea and vomiting ceased, the abdomen became less tender, but there remained some residual tenderness and rigidity of the right rectus.

Examination. Patient in fair flesh. Extremely nervous. Pulse 80 and regular. Temperature 99. Auscultation and percussion of the chest negative. Abdomen: Liver and spleen not palpable. Slight tympany over whole, more especially in the right lower abdominal quadrant. The right rectus was rigid and there was marked tenderness on pressure over McBurney's point. Urine was normal. A diagnosis of an acute exacerbation of a chronic appendicitis was made and operation advised and accepted. Operation February 11, 1908. Ether by drop method. Anæsthetic taken very easily and amount small. The regular McBurney incison was made and the omentum found congested and adherent to caput. The caput and appendix delivered with a little difficulty and head of colon found congested. The appendix was completely studded with miliary tubercles and a few were found on the cæcum. The walls of the appendix were thickened and a few enlarged glands found in the mesentery.[1] The appendix was removed and the enlarged glands in the mesentery excised. The thickened omentum that was adherent to the appendix and cæcum was also removed and the wound closed in the usual manner.

Post-operative history. There was a slight operative rise of temperature but that soon subsided and on the 16th of February patient was allowed a generous diet. The wound healed by primary union and within a week following the operation the patient expressed herself as feeling much better than she had for some few months. At this report she is in good flesh, sleeps and eats well, has not had the least sign of any abdominal trouble, and considers herself and looks to be in perfect health.

[1] The right tube and ovary were examined and appeared to be in a normal condition. There were no adhesions between these organs and the appendix. Palpation of the left tube and ovary did not disclose any trouble.

TWO OPERATIONS FOR TOTAL DESTRUCTION OF THE GALL-DUCTS — ONE FATAL, ONE SUCCESSFUL

By EMORY LANPHEAR, M. D., Ph. D., LL. D., St. Louis, Missouri
Professor of Surgery in the Hippocratean College of Medicine; Consulting Gynecologist to the Ellen Osborne Hospital

Case 1. A woman, age 48, farmeress, was admitted to hospital suffering from sepsis, with a large swelling in the region of the gall-bladder. She gave a history of gall-stone colics, of repeated cholecystitides, of progressive health-failure, and of a recent unusually severe attack of colic with jaundice, etc.

On opening the abdomen a huge infrahepatic abscess was found, containing stones, pus, remnants of gall-bladder and bile. Examination showed total destruction of gall-bladder and ducts, the stump of the hepatic duct protruding into the abscess-cavity. After the debris was cleaned out the duodenum was sought and when found, opened on its

upper aspect to permit the bile to find its way into the gut after granulations should close the external wound. This was done at this time because, 1st, it was not safe to open the non-infected peritoneum to get a loop of jejunum, and 2d, the woman, it was known, would not submit to a second operation.

The bile did not flow into the duodenum howsoever tightly the packing was inserted in the external opening; it would accumulate in vast quantities and pour out in the bed when the plug was removed.

Feeding was begun on the second day, as the patient was weak and hungry. When the gauze stopper was removed to let out the accumulated bile, some hours later, all the food taken ran out with it. Thereafter practically everything the woman ate came out through the duodenal opening, which seemed to grow large and larger as the time passed.

She died of starvation on the fourteenth day.

A NEW OPERATION

CASE 2. A man, aged 41, of previous good health, except typhoid fever at 27, was taken with gall-stone colic early in September. He became severely jaundiced, with clay-colored stools, and soon found a tumor forming below the rib-margins, with much pain and fever. Operation revealed a widely distended gall-bladder containing 40 or 50 stones and occlusion of the common duct by an impacted stone. This stone was pushed back into the cystic duct (by perhaps too much pressure?) by the fingers and removed with a scoop. The gall-bladder was drained, but soon closed and the man considered himself cured.

In December he was seized with a severe chill, intense pain, and alarming collapse. This was followed by fever, and formation of a mass in the region of the gall-bladder, with jaundice. He became septic and very ill. On the tenth day he consented to a second operation, when incision revealed an enormous abscess under the liver, extending to the diaphragm. It contained the sloughing gall-bladder. The trouble seemed to have started in the common duct where undue pressure was possibly made in dislodging the stone. Nothing resembling a duct could be seen.

By February he was in fairly good condition but all of the bile came through the fistula and a probe showed quite a large cavity where the gall-bladder had been. On opening this widely the remnant of hepatic duct could be seen sticking out from the under side of the liver; everything also was obliterated by adhesions. After careful cleansing the cavity was plugged with gauze.

The peritoneal cavity was now opened quite widely and the omentum and colon withdrawn and protected by warm, moist towels. The duodenum was found and followed about three feet on to the jejunum, to a point where the mesentery was sufficiently loose to permit a good deal of stretching without interference with its circulation.

The intestine was here cut squarely across and the lower end pulled well out of the abdomen and properly protected. Then an opening was made in the side of the gut about a foot below the transection and the upper end of the severed bowel sewed into the opening, an end-to-side anastomosis. A hole was next made through the transverse mesocolon and barrier of adhesions into the fistulous cavity and the free end of jejunum passed through it; and colon and omentum returned to the lower abdomen. Four or five stitches were inserted in the wall of jejunum and the sides of the opening through which it passed, to shut off possible leakage into the peritoneal space below.

The mucous membrane of the jejunum having been trimmed away by scissors and the under surface of the liver "freshened" by scraping around the projecting end of hepatic duct, the end of the jejunum was sutured around the hepatic duct by 20-day chromic catgut, as well as possible, but it was hard work in close quarters and no doubt the sewing was not perfect, for bile came through the packing on the second day, though some at once passed into the intestinal tract as was evidenced by the stool on the fourth day.

Before insertion of the packing the walls of the cavity were carefully scraped to facilitate closure by granulation. Closure, however, has never been complete; a small quantity of bile is discharged daily through the fistula; but the biliary stream passes through the artificial duct so the stools are normal and the patient in perfect health save for the trifling irritation around the outlet of the biliary fistula.

ACETONURIA, WITH COMA, APPARENTLY CURED BY INTRAVENOUS TRANSFUSION OF BICARBONATE OF SODA SOLUTION

By B. F. VAN METER, Lexington, Kentucky

I have been unable to find in the literature any mention of the use of bicarbonate of soda used intravenously in cases of acetonuria with coma in which the patient apparently recovered. Therefore, it has occurred to me that a report of the following case occurring in my practice would be of interest.

R. L. White, age five and a half years. Operated on February 27th a. m. Tenotomy left tendon of Achilles, for acquired club foot. Rectal fistula. Opened, curetted, and packed with plain gauze. Ether anæsthesia. Reacted from anæsthetic, vomited once, clear fluid, condition very satisfactory. In afternoon February 28th, about thirty hours after the operation, patient became markedly nauseated, restless, and complained of great thirst. Temperature, 99; respiration, 25; pulse 101. At 8:30 p. m., enema of sulphate magnesium, castor oil, and potassium bromide, from this, a few hours later, he had a good bowel movement. During night of the 28th he vomited almost constantly, extremely restless; sighing respiration, in spite of water being allowed by mouth ad. lib., he complained of great thirst. On the morning of the 29th condition the same. Sweet odor to breath. Urine analysis showed acetone in considerable quantity; no sugar, no casts, no albumin acid in reaction. Soda bicarbonate solution ordered to be given by rectum, also sugar by mouth and all the water the patient desired, which was large quantity. Three p. m. same day, temperature, 98; respiration, 24; pulse, 144, had been reported at times to be 170. Patient in profound coma from which he could not be aroused. Slightly cyanosed with a peculiar white mask about the lips. Five p. m., vein opened at elbow of right arm, 750 c.c. normal salt solution, rendered strongly alkaline with soda bicarbonate introduced. Thirty minutes after transfusion sleeping quietly, pulse 110. Eight-thirty p. m., no coma, patient apparently normal. March 1st, urine examination showed acetone markedly diminished. March 2d, no acetone present and none at succeeding examinations. I have been unable to find any mention in the literature of bicarbonate of soda being used intravenously for this condition.

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INTESTINAL OBSTRUCTION DUE TO ROUND WORMS

By B. F. VAN METER, Lexington, Kentucky

Intestinal obstruction due to round worms is not so common but that the following report is worthy of being placed upon record.

Operation Recovery.

Case 1. George S., colored, male, age five years. Referred to hospital by Dr. O. F. Brown.

May 27th. — Examination showed sausage-like mass little above and to the left of McBurney's point. Gave a history of nausea and vomiting; no history of bowel movement for twenty-four hours; had taken calomel and santonin without effect; some days previous had passed worms, temperature, 102-6; pulse, 130; diagnosis, "Intestinal obstruction probably due to worms." Operation proceeded with immediately. Abdomen opened through right rectus, large mass in lower end of ilium about six inches long immediately delivered, intestine considerably over distended from a great mass of round worms, obstruction complete. Gut opened by a two and a half inch incision, nearly a wash basin full of worms removed. Gut closed with double row of sutures, returned to abdomen. Abdomen closed in layers; patient returned to bed in fair condition. Rallied from operation well. Dressed on tenth day, stitch abscess. Discharged from hospital in two weeks; wound healed perfectly.

A SIMPLE OPERATION FOR COMPLETE REMOVAL OF TONSILS WITH NOTES ON 800 CASES

By GEORGE E. WAUGH, B. A. (Cantab.), M. D. and B. S. (Lond.), F. R. C. S. (Eng.)
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It has long been recognized that the tonsil resembles, in mode of development[1] and structure an ordinary lymphatic gland. That, further, as a result of disease, it undergoes changes which are identical with those occurring in lymphatic glands in other parts of the body under similar morbid conditions. Nevertheless, the treatment of these conditions — except of such rare ones as invasion by malignant neoplasms — has not been carried out upon those surgical principles which govern the treatment of diseased lymphatic glands in other regions. The reasons alleged by writers upon the subject are generally either that that form of treatment which violates those principles, i. e., tonsillotomy is quite satisfactory — or that that form of treatment which implies adherence to those principles, i. e., tonsillectomy, is too difficult.[2] Neither of these reasons appears to me to be valid. The failure of tonsillotomy by other operators in one hundred and twenty-nine out of the eight hundred cases here recorded and the designing of a simple and safe form of tonsillectomy, to be described later, appears to support this conclusion.

It is probably a common experience of all out-patient departments — and certainly of my own at Great Ormond Street — to find a large number of patients upon whom tonsillotomy has been performed, and in whom no relief either of the local or general condition for which the operation was done has resulted. From the frequency with which the operation has been repeated — sometimes as often as three times — and from the fact that the operation has been performed by many operators at other hospitals in these one hundred and twenty-nine cases, it seems right to conclude that the cause of failure lies not with the operator, but with the type of operation. Even in highly skilled and experienced hands, the complete removal of a tonsil by means of the guillotine is a task of such mechanical difficulty as to be — except in a few rare cases — quite impossible.

The cause of failure to afford relief on these cases already alluded to, is the persistence of the remains of septic tonsillar tissue of such size as to be quite inaccessible to the guillotine. This further emphasizes the fact that it is not primarily *the size* of the tonsil which matters, but *the septicity*, and this may be of a high degree in a comparatively small tonsil. By virtue of its situation, at the upper end of the alimetary tract, a diseased tonsil can pour septic contents from its cryptic surface continuously into the alimentary canal at the same time as absorption can occur through its lymphatics into the adjacent glands in the neck. It thus has a twofold power of doing harm. The danger of continually swallowing septic matter from carious teeth has long been recognized, but the similar danger of continually swallowing septic material from decaying tonsils has not been sufficiently emphasized. This attitude of indifference has largely arisen from regarding the removal of tonsils as being only necessary, when it is possible to slip them through the ring of a guillotine. Hence the potency of the small embedded septic tonsil to do harm is easily overlooked — and more especially in children, who seldom complain of a "sore throat," even when the tonsils are inflamed. Provided that the tonsils give rise mechanically to obstruction to swallowing or breathing on account of their size, or the patient suffers from frequent attacks of sore throats, or has enlarged glands in the neck, or intractable middle ear disease, the cause of the trouble is promptly recognized. But there is a large group of cases which is characterized by none of these troubles, and is made up of children who are simply profoundly debilitated, poorly nourished, exhibiting lassitude both in work and play, and who are frequently described as being victims of a "weak constitution."[3] Sometimes there is direct evidence of disorder of the alimentary tract, such as pain and vomiting after food, obstinate constipation, or frequent attacks of offensive diarrhœa. It is not to be supposed, however, that these groups of symptoms are to be explained solely by the presence of diseased tonsillar tissue. They are merely evidence of chronic toxæmia, and in searching for the primary focus of infection, the small embedded irregular tonsil must not be overlooked. And even when this type of tonsil was present — as it was in the one hundred and eighteen of the cases recorded, and which

[1] See paper by Dr. G. S. Hett on the development of the tonsil. I am indebted to him for leave to refer to it before publication.

[2] Index of Treatment, by Hutchison & Collier. Article on "Tonsillitis." (London, Simpkin, Marphall & Co.)

[3] Manual of Surgical Treatment, Cheyne & Boughard, Part VI, Sec. 1, p. 75.

Fig. 1. Shows embedded tonsil grasped by ring forceps.

presented these groups of symptoms, it was not considered justifiable to remove them until a physician had satisfied himself that no other cause for the illness could be detected.

(Most of these one hundred and eighteen cases were under the care of my colleague Dr. R. Hutchison, to whom I am indebted for permission to refer to his notes upon them.) That it is the main cause in a very large number of cases is indicated by the results following complete removal.

The objection to "tonsillectomy" on account of the difficulty of the operation has been overcome by the following operative procedure, which has already stood the test of application to over eight hundred cases.

The instruments required are two Hartmann's ring choncatomes, one pair of curved scissors, and one pair of fine-toothed dissecting forceps. The patient must be prepared by a preliminary visit to the dentist, so that no operation on the oral is performed until all carious teeth have been stopped or removed. The patient is placed in a recumbent position with a sand-bag beneath the shoulders, with the head falling slightly backwards, so that the naso-pharynx slopes backwards and downwards, thus enabling the small quantity of blood which is shed to trickle toward the nostrils rather than towards the larynx. A loop of silk is passed through the tip of the tongue for the purpose of retraction, and a gag inserted between the last molar teeth. The tonsil is then seized in one of the pairs of ting forceps and drawn gently towards the middle line (Fig. 1), so that the embedded part of the gland bulges beneath its normal covering of the anterior pillar of the fauces (Fig. 2). Immediately external to the internal margin of the anterior pillar, just where it blends with the surface of the tonsil, an incision is made with the fine-toothed forceps, parallel to and extending for the whole length of the free margin of the anterior pillar (Fig. 2). This incision reveals the capsule of the tonsil which now appears as a glistening smooth bluish-white surface (Fig. 3).

(The ease and success of the operation depends upon this incision displaying the capsule of the tonsil and not entering its substance. This mistake is easily made by keeping too near to the pharyngeal face of the tonsil, and it is the common cause of difficulty and failure for beginners.)

The ring forceps are then adjusted so as to get a firm hold upon the tonsil and the anterior pillar is drawn outwards by means of the fine-toothed forceps. The tonsil is then practically dislocated from its bed, and the separation of the rest of the layer of fine cellular tissue intervening between the capsule of the tonsil and the muscular wall of the pharynx is easily effected either by the fine-toothed forceps or by a closed pair of curved blunt-ended scissors which fit in behind the whole of the tonsil and push the pharygneal wall away from it (Fig. 3). Since the tonsillar vessels are there-

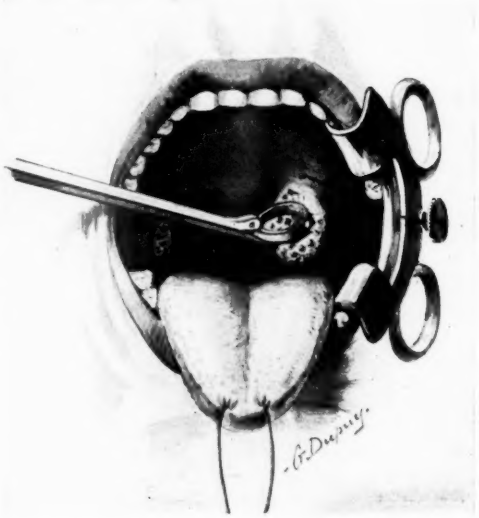


Fig. 2. Shows tonsil drawn upwards with the imbedded part bulging beneath the anterior pillar of the fauces. Dotted line indicates line of incision.

by torn across and are able to retract within the muscular wall of the pharynx, there is practically no bleeding — in fact the absence of bleeding forms a striking contrast to the sharp hemorrhage which ensues after the tonsil has been cut across by a guillotine.

The time occupied in the complete removal of both tonsils and adenoids is, on an average, three minutes. A brief deep anæsthesia with chloroform is necessary, and the coughing reflex should be abolished. If it is present, it adds distinct danger to the operation, since coughing enormously increases the hemorrhage, and during the ensuing inspiration, blood could easily be sucked into the larynx. Under the conditions detailed above, there is no danger of this happening. During the operation, traction upon the posterior pillar of the fauces must be avoided since it gives rise to a troublesome spasm of the glottis.

For the after-treatment, a simple mouth wash is provided, and a mixture containing salicytate of soda and chlorate of potash, administered every few hours. The patients are kept in bed for about forty-eight hours and are allowed solid food when they feel inclined for it. With children, this is frequently on the day after the operation.

All the above eight hundred cases have been seen at the end of a week, and at the end of five weeks from the date of operation. Their ages range from three months to forty-one years. There have been no complications, such as hemorrhage or sepsis. As a rule, the temperature seldom reaches 100 F. after the operation. Of the one hundred and eighteen cases who have been chiefly under the care of Dr. Hutchison, suffering from general debility, nine showed no improvements after the operation. The remainder made a rapid and complete recovery. Of those suffering from throat symptoms only six

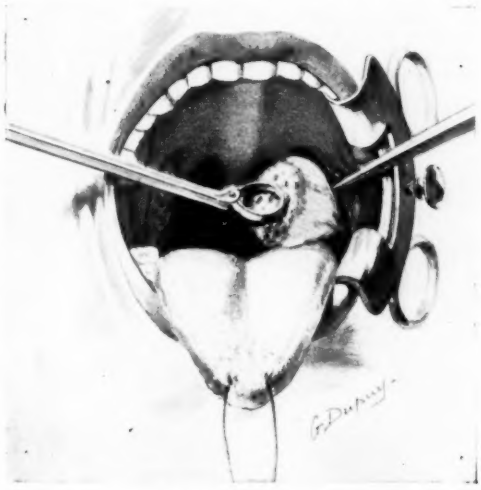


Fig. 3. Shows the large encapsulated part of the tonsil now revealed and being shelled out of its pharyngeal bed.

hundred and eighty-two have been operated upon. Of these one hundred and twenty-nine had already had their tonsils "guillotined"— some of them as often as two or three times — at other hospitals, with no relief to them. They all made an uninterrupted recovery. A typical case from this group may be quoted: "Patient R. S., aet. nine years, had his tonsils guillotined at a London throat hospital on November, 1906, on account of sore throat. He continued to suffer from them until March, 1907, when he contracted scarlet fever. Since then, the attacks of sore throat had become more frequent. On examination, large embedded masses of tonsillar material were seen present. Since the removal of these by dissection in July, 1907, he has remained quite well."

A NEW INSTRUMENT FOR OPENING THE SKULL

By JAMES M. NEFF, M. D., Chicago Illinois

Although many appliances have been devised for opening the skull, as yet none has fulfilled the requirements of a practical surgical instrument; namely, that it be simple in construction, easy of manipulation and rapid, but at the same time safe while in operation.

It is not our intention to discuss in this article all of the different methods and instruments which have been brought out from time to time, but rather to describe briefly a few of those which have been more generally adopted.

Probably the safest and simplest of the instruments in use are the biting forceps of Montenovesi, Dahlgren, and De Vilbis, but as only a small fraction of an inch of bone is divided at each bite of the forceps, the formation of an osseous flap is extremely slow and tedious, usually requiring from twenty-five to thirty minutes.

Doyen's method, recommended by him in 1895, is a more rapid procedure. He first perforates the skull along the line of division of the soft parts, and then cuts the bone with a circular saw, from one perforation to another, the dura being protected from injury by a guide plate, which is placed beneath the saw. The main objections to his instrument, and to all others involving the principle of the plain circular saw, are first, that a curved incision cannot be made through the skull, and secondly, that the dura is likely to be injured by the blade or guide plate.

With the Van Arsdale concave circular saw it is possible to make a curved incision, but unless the saw follows exactly along the projection of its curve, it becomes wedged in the slot and is difficult to remove.

Toison, Abaninski, and Gigli divide the skull from within outward, by means of a wire saw. The bone is drilled at intervals along the line of proposed incision, and then cut by the wire, which is inserted through one perforation and brought out of the next. The dura is protected by a director placed between it and the bone. An advantage claimed for this method is that the cut is very narrow and may be beveled; but even under favorable conditions the process is a slow one and the dura is in danger of being opened, especially when adherent to the bone.

The "Spiral Osteotome" devised by Dr. M. H. Cryer of Philadelphia (Journal of the A. M. A., October 3, 1908) more than fifteen years ago, is a thoroughly practical and mechanical instrument. It consists of a one-eighth inch spiral mill, which is set into a chuck or hand piece. The mill is rotated by electrical power, transmitted through flexible shafting. The lower or cutting portion is one-half of an inch long and is doweled into a seat in the dural protector (an oblong button, which is placed beneath the mill). A vertical rod behind the mill connects the protector with the chuck.

The instrument is controlled from above by grasping the hand piece, and cuts the bone in the same manner as the milling machine cuts metal.

The osteotomes of Sudeck and Meissel, introduced in 1900, involve the same principle as that of Cryer, and are used in the same way.

An ingenious instrument was described by H. C. Masland in the Journal of the A. M. A., March 4, 1905. A small circular saw, driven by an electric motor, is set in the end of a handle, and the depth of the cut regulated by an adjustable guard, placed at the side of the blade. The same objections apply here as to Doyen's instrument.

Hartley and Kenyon of New York, in the Annals of Surgery, April, 1907, give a detailed account of a new apparatus which they have used since 1900. They dispense with the flexible shafting and employ a small electric, or compressed air motor, which is held in the hands while in use. A chuck, attached to the spindle of the motor, carries the spiral mills, trephines, and circular saws. The metal casing of the motor is removable and can be sterilized by boiling. The technique of their method is practically the same as that of Doyen.

The instrument which forms the subject of this article was designed by the writer a year and a half ago, and since then has been used by Dr.

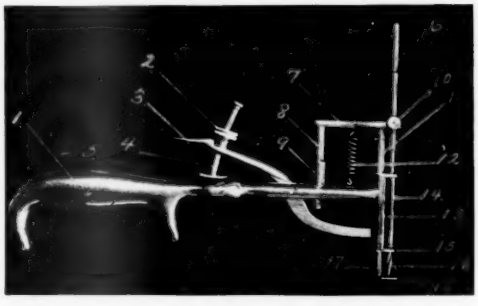


Fig. 1.

J. B. Murphy and self in all of our cranial operations. It has given us uniform satisfaction and has enabled us to cut the bony flap in about one-fourth of the time which was required when we used the De Vilbis forceps.

It is very simple in construction, as shown in the accompanying photographs, and easy to operate after one has had a little experience in its use.

The working principle is that of the milling machine, but its application in this instrument is, we believe, original, in that the revolving mill is controlled by a handle from behind and the skull is always engaged between two fixed plates (Fig. III, 14, 15) which assures protection to the dura and brain. The handle, placed as it is behind the mill, gives the operator perfect control and enables him to observe the work of the instrument more closely than is possible when it is guided from above as in the Cryer osteotome.

Our experience has proved that it is immaterial, so far as subsequent bony union of the flap is concerned, whether the cut through the bone be a sixty-fourth, or an eighth of an inch wide, or whether it be beveled or straight. The bone unites just as readily in one case as in the other, provided the periosteum is not detached, and that its edges are sutured together after the flap is replaced.

Pressure of the flap on the underlying brain has never given us the slightest trouble, as the periosteal sutures support it on a level with the surrounding bone, and the starch skull cap, which is applied after the operation, prevents undue pressure upon it from without. We, therefore, consider the beveled cut unnecessary.

The first model used by us is shown in Fig. I. It consists of three essential parts: namely, (1) the handle and frame, made in one piece (Fig. I, 1), (2) the combination mill holder and dural protector (Fig. I, 7, 8, 11, 17, 18), and

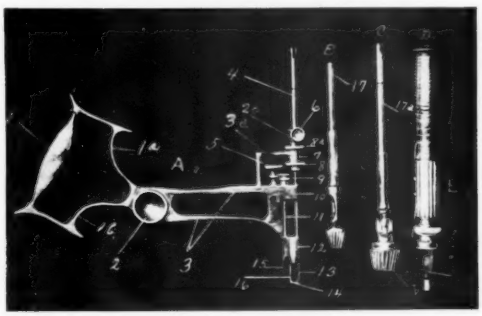


Fig. 2.

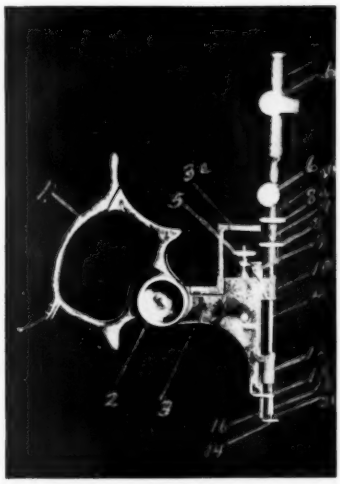


Fig. 3.

(3) the spiral mill (Fig. I, 16), the shank of which (6) fits into the chuck (Fig. II *D* 19).

The handle and frame are made of brass, the mill holder (Fig. I, 7, 8, 11, 17), dural protector (18), and spiral mill (16) of tool steel. The vertical shafts of the mill holder (8, 11), connected by the horizontal piece (7), fit accurately into the two upright brass bearings (9, 13) of the frame, the one sixteen-inch rod (17), which supports the dural protector (18), being a prolongation of the shaft (11). The support (17) is placed one-eighth of an inch behind the spiral mill (16), thus allowing a very small circular cut to be made in the bone.

The distal end of the controlling lever (3) fits into a vertical slot in the shaft (11), elevating the mill holder and dural protector when downward pressure is made upon its proximal end (3). The spring (12) keeps the lever in contact with the set screw (2), except when it is pressed downward at the proximal end (3). By turning the screw (2) upward or downward, the protector may be set for any thickness of the skull, after estimating this through the trephine opening.

The original idea was to avoid injury to the dura, during the operation, by maintaining constant pressure with the thumb on the lever (3), thus closely engaging the bone between the protector (18) and upper plate (15). Experience proved that this was unnecessary, and that the instrument could be more easily controlled if the protector was properly set before beginning the operation, thus leaving the thumb free to grasp the handle.

Fig. 4. Motor, mounted on pedestal, with flexible shafting attached.

In the second model therefore (Fig. II), following Dr. Murphy's suggestion, the lever was discarded, and the dural protector (Fig. II, 14) raised or lowered, by turning the thumb nut (5), the flanged portion of which fits into the grooved upper end (9) of the shaft (16). In this instrument the chuck holder (3*a*, 20(forms part of the frame, and the detachable handle (1) can be set at any angle and fixed by a set pin not shown in the cuts. Two types of handle are provided for use with this instrument, one, a heavy saw pattern, the other, a smaller and lighter type (Fig. II, 1).

The spiral mill (Fig. II, 4, 13) is made of hardened tool steel. The cutting portion (13) is nine-sixteenths of an inch long and one-eighth of an inch in diameter. The shank (4) revolves in the bearings (10, 12), and the cutting end terminates in a small pin (Fig. III, 21), which is set in a hardened steel bearing in the dural protector (Figs. II, III, 14). When the instrument is in use, the entire strain on the mill is between the two fixed points (Fig. III, 14, 15), and as these are never more than five-eighths of an inch apart, it is practically impossible to break the mill, no matter how much pressure is used. Each of the five spiral teeth of the cutting portion (Figs. II, III, 13), is ground to a keen edge, and makes a turn of forty-five degrees through nine-sixteenths of an inch. The bone chips are forced upward in the four flutes between the teeth, and escape through the openings in the lower end of the bearing (Figs. II, III, 12).

In the third model we have again slightly modified the instrument, by shortening both the frame and chuck, and simplifying the mechanism of the latter (Fig. III). By placing the handle closer to the mill, the operator is given better control of the instrument, and the short chuck allows greater freedom of motion, which is so essential in any cutting tool. The chuck was simplified by employing set screws, instead of springs, to secure the shaft and mill in position. This does away with the slot in the shank of the mill, where breakage occasionally occurred.

The flexible shafting (Fig. IV), which transmits the power from the motor, is received in the upper end of the chuck (Figs. II, III, *D*) and is secured by the set screw (Fig. III, *b*). The lower end of the chuck, which holds the spiral mill, fits accurately in the socket (Figs. II, III, 20), where it is fixed by the screw (6).

The motor (Fig. IV) used to operate the instrument, is of one-sixth horse power, for either direct or alternating current. It is mounted on a pedestal and can be elevated five feet from the floor, thus allowing the cable to drop over the operator's shoulder. Before the operation the detachable chuck is sterilized by boiling, and a sterile muslin sheath is slipped over the cable, rendering aseptic all parts of the apparatus which come into the field.

The power is controlled by a foot switch, placed

on the floor beneath the ball of the operator's foot. Slight pressure on the button of the switch closes the circuit, which is automatically broken when the pressure is removed. A rheostat in the base of the motor regulates the speed.

The flexible shafting is of the "spiral, spring, wire type," encased in a braided sheath covering. At high speed it transmits sufficient power to operate the trephines and cutting mills.

TECHNIQUE

As we follow the Hartley-Krause method more frequently than any other, we will briefly describe the use of the instrument in that procedure.

A horseshoe incision is made through the scalp down to the bone, and the perioteum separated from the bone at the posterior angle. The scalp and periosteum are then retracted in this position and the initial opening in the skull made with a large size, De Vilbis trephine (Fig. II, *C*), (or spiral end mill), which is mounted on a special shank (Fig. II, *C*, 17a) for attachment to the chuck of the cable. After the trephine opening is started, the pin is removed, and the opening completed without it. As the trephine is beveled from its base to the cutting edge (Fig. II, *C*, 18) the dura can not be injured, but is pushed downward by the button of bone in the end of the trephine and thus separated from the inner table around the edges of the opening. This step of the operation seldom takes more than one and a half or two minutes.

After the button of bone is removed the trephine is detached from the chuck, and the spiral mill inserted. The chuck, carrying the mill, is next placed in position in the socket (Figs. II, III, 20) of the cutting instrument and secured by tightening the set screw (6). The dural protector and mill are then inserted in the opening, the motor started at full speed, and the revolving mill pressed firmly against the bone in the direction of the proposed incision. Considerable pressure should be applied to the mill, but this must be *intermittent* and *not* constant, as the best results are secured by "*backing up*" every quarter of an inch, to give the chips an opportunity to escape through the flutes, and also to prevent overheating of the mill. Every mechanic who has had experience with the milling machine knows that this occasional "*backing up*" is of the utmost importance.

When the bone incision is completed the motor is stopped and the instrument removed by following the cut back to the trephine opening, after first removing the chuck and mill.

The base of the osseous flap is then nicked with the chisel at each angle, and the bone pried upward by means of an elevator inserted under the convex border. The fracture through the base occurs along the line determined by the nicks.

After the operation is finished, the bone flap is replaced and the edges of the periosteum sutured together with catgut. The incision in the scalp is then closed in the usual way, and a starch skull cap applied over the dressings. This cap becomes almost as hard as plaster of Paris after a few hours, and protects the wound from external injury.

The instruments were manufactured for us by Mr. Frank Holt, of Chicago, and we are indebted to him for suggesting and working out many of the mechanical details.

THE OPERATIVE TREATMENT OF AN IRREDUCIBLE FRACTURE OF THE SURGICAL NECK OF THE HUMERUS

By J. H. JACOBSON, M. D., Toledo, Ohio

Fracture of the surgical neck is the most common form of fracture of the upper end of the humerus. When irreducible, it offers a bad prognosis for restoration of perfect function of the arm at the shoulder joint. The well-known classical fractures at the upper end of the humerus, other than that of the surgical neck, such as, fractures of the head, of the anatomical neck, in the epiphyseal line, of the greater tuberosity, and those fractures accompanied by dislocation of the head, are likewise amenable to the operative treatment herewith described.

The difficulty of maintaining accurate reduction of fractures of the surgical neck is due mainly to our inability to control the upper fragment, and the great leverage with tendency toward displacement exercised by the lower fragment. The disproportion in size and weight of the lower as compared with the upper fragments is thus very great.

Reduction of these fractures may be extremely difficult, impossible, or unsatisfactory, when treated other than by the operative treatment. The desirability of perfect reduction with accurate alignment of a fracture is of course obvious, and should be

Fig. 1. Case 1. Before operation.

obtained by operative measures when ordinary measures fail.

Since the Roëntgen ray has demonstrated the malposition of fractured ends, even after supposedly good reduction and functional restoration of the part, no one to-day will consider such results as "surgically perfect." Lane's dictum, "A good anatomical result as well as a good functional one," seems to be gaining in favor.

Lambotte says that "every fracture which still remains uncorrected after proper methods of reduction, calls for surgical intervention." This is very true regarding fracture of the upper end of the humerus.

Many mechanical devices have been employed for direct splintage of fractures; wire, nails, screws, staples, and plates of various kinds are recommended and employed.

The steel plates as shown in Fig. 5, as used at the present time by Arbuthnot Lane of London, will be found suitable for nearly all fractures. Ordinary steel screws ($\frac{3}{8}$–$\frac{3}{4}$ inch) are employed to fasten them to the bone. They are much simpler than the plates and screws of Lambotte and Depage, and are better adapted to fractures of the upper end of the humerus than any other device.

Case 1. School boy, age 15, was admitted to the Lucas County Infirmary Hospital, July 6, 1908, with the history of having fallen from a tree, striking his left shoulder, one week before entering hospital. Immediately after receipt of the injury, reduction was attempted by a physician but without success. Examination of shoulder showed loss of function, considerable swelling, with inability to move arm without pain, while the X-ray examination (Fig. 1), made by H. W. Dachtler, revealed a typical fracture of the surgical neck of the humerus, with rotation of the head, and forward and outward displacement of the upper end of the lower fragment.

On July 8, 1908, under ether anæsthesia, an attempt of reduction was made, this was found to be impossible. A Langenbeck's incision on anterior aspect of the shoulder was made, and seat of fracture exposed. The fracture could not be reduced by traction and manipulation without sawing about $\frac{1}{2}$ inch of bone from the upper end of lower fragment. Reduction was then easily accomplished. A double-headed steel internal splint was now fixed in situ, two screws were driven into the upper as well as in the lower fragment. (Fig. 2) The wound was closed without drainage, and a plaster-of-Paris jacket was applied. Following the operation it was necessary to give $\frac{1}{4}$ gr. of morphine for pain, on the day of the operation, otherwise the recovery was uneventful, with primary healing of wound, the patient leaving the hospital in 7 days. Passive motion was begun at about the second week. Restoration of function after two months was perfect.

Case 2. Elevator boy, age 16, referred by Dr. J. C. Reinhart, Toledo, Ohio, was admitted at St, Vincent's Hospital, September 1, 1908. Two weeks previous to his entrance in the hospital he fell from a box car, striking his right shoulder. This was followed immediately by great pain with swelling of the shoulder and loss of function of the arm. The boy was immediately anæsthetised by Dr. Reinhart and reduction of the fracture made. Three days later, Dr. Reinhart being dissatisfied with the appearance of the arm, advised an X-ray examination, which was made by H. W. Dachtler (Fig. 3), and which revealed a fracture of the surgical neck of the humerus, with forward displacement and overriding of the lower fragment. The

Fig. 2. Case 1. After operation.

upper fragment was in the position assumed during a moderate amount of normal abduction of the arm.

On September 1, 1908, under ether anæsthesia, the same procedure as described above for Case 1 was carried out. (Fig. 4.) There was no pain following operation, and recovery was uneventful, and healing of wound primary. Patient left the hospital in four days.

Passive motion was begun on the 10th day. Restoration of function was perfect after about two months.

The method followed in these two cases seemed ideal. Lane, in speaking of fractures of the surgical neck of the humerus, states that: "in dealing with fractures under such conditions, staples are by far the best means by which a secure and perfect junction can be obtained, since the upper fragment does not offer facilities for carrying a wire and is too friable to hold a screw."

This was not found to be true in my cases. While the cancellated structure of the upper fragment permitted the screws to enter easily as compared with the compact structure of the lower fragment, yet it was not brittle and was sufficient to hold the fractured ends securely. This was demonstrated easily by rotating the arm and lifting it above the patient's head before the closure of the wound.

The accurate apposition of the fragments in these cases, as well as the firmness with which they were held in place, has led me to the opinion that

Fig. 4. Case 2. After operation.

Fig. 3. Case 2. Before operation.

when internal splints are employed, prolonged fixation, with plaster jackets and splints is unnecessary, and that passive motion and massage (as early as third or fourth day) can be used much earlier than by any other method. This is, of course, of special importance in fractures in the vicinity of a joint or involving joints.

Good results with the operative treatment of fractures can only be obtained by the most rigid asepsis, which is absolutely essential to success. Most of the work should be done with instruments,

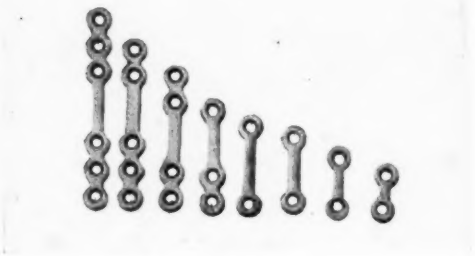


Fig. 5.

so the gloved hand and fingers do not come in contact with the wound surfaces or patient's skin.

With rigid asepsis carried out in proper surroundings, steel plates and screws will seldom if ever produce trouble that will necessitate their removal.

CONCLUSIONS

1. In fractures high upon the humerus, the great leverage exercised by the lower fragment on the lesion tends toward displacement of it after reduction.

2. Reduction, with nonoperative treatment, should always be attempted in fractures high up in the humerus, but should always be controlled by X-ray examinations, and when found to be irreducible, operative interference is demanded.

3. Steel plates and screws are our best means of internal splintage in fractures of the surgical neck of the humerus.

4. The most rigid aseptic technique must be employed.

5. The metal plates and screws, when properly employed as a rule give no trouble, and are easily removed if they do.

6. Prolonged fixation of the arm is unnecessary with this method, and passive motion can be used earlier than in any other form of treatment.

THE INSTRUMENT TREE

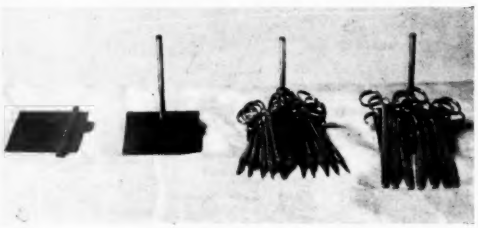
By SAMUEL E. NEWMAN, St. Louis, Missouri

Surgery from time to time has adopted many an idea from the arts. We learn from one another and in this way the progress of our science is gradually made to occupy a more advanced position. The suggestion which I have to offer is simple indeed, but a practical aid to surgical work. File your instruments just as you would your letters or your bills.

The instrument-tree has a base of thin, hard metal, the width of which is 3 inches and its length $3\frac{1}{2}$ inches. At one end is a threaded opening into which the upright rod may be screwed. This pin should best be $3\frac{1}{2}$ inches high.

In your instrument case, this tree will help to keep the instruments assorted and together. On the table in the operating-room or on the instrument-tray, which is kept close to the operator, the files will hold the clamps and hemostats, most conveniently ready for use.

There will surely be fewer instruments on the towels about the field of operation and fewer falling to the floor, if each file is made to do its



work. The surgeon and the assistant both soon form the habit of returning the used instruments to the tree as soon as they are removed from the tissues. This does not consume as much time as to carelessly place the instruments to one side or to hand them to a third person.

We know too well that there is always a remote possibility of an instrument being left in the abdomen; if the device will help in this direction only, its value cannot be questioned.

I am sure the tree will give to the operator's work greater dispatch and less confusion.

J. M. BALDY, M. D.

DEPARTMENT OF
NICHOLAS SENN FESTSCHRIFT

TREATMENT OF UTERINE RETRODISPLACEMENTS

By J. M. BALDY, M. D., Philadelphia

LIKE the poor, this subject seems to be always with us. There come periods of quiescence in its discussion, but nothing, however apparently conclusive, seems able to bring the end. Nevertheless, each agitation leads us nearer the goal, and at the present time we have made marked and permanent advances towards that end. There was a time when "ascites" was described as and believed to be a disease. It has been long since fully established that it is but one indication of a serious pathological change of a definite character in some one of the internal organs, and to-day he would be a bold man indeed who would venure to describe ascites as a distinct lesion. So it is in a lesser degree with retrodisplacements of the uterus. The time will come when men will be just as much ashamed to speak and write of them as a distinct disease as they are at present so to speak and write of ascites.

All rules have exceptions which in no way vitiate the truth of the rule, and so it is with this lesion. There are some cases in which it would seem as though the displacement were the only thing which would explain the symptoms from which the woman suffered, and in which a replacement of the womb cured the patient. But the more one sees of gynecologic practice the fewer unexplainable cases come under observation and the closer one is able to limit this list of exceptions.

The rule is this: *Retrodisplacements of the uterus are mostly coincident with other lesions, and where such is the case the symptoms almost universally come from the associated disease.*

Any number of uncomplicated uterine displacements are constantly being reported, and physicians continually send for treatment cases they think they find in their practice, and yet to be perfectly frank, the fault in the majority of cases is not with the condition but mostly with the lack of accuracy in the diagnosis of the practitioner. This is said in a spirit of charity, in the interest of better education and scientific accuracy, and not in that of wanton criticism; in either case, however unpalatable, it is, even at this late day, the truth. When a practitioner of medicine attends a case in which there exists a retrodisplacement of the womb together with a prolapse of the

ovaries, which ovaries are adherent or even cirrhotic, and he sees only the displacement of the womb and conceives that this alone induces the symptoms, why should he complain if it is suggested that his diagnostic powers are a bit undeveloped? Nor is it altogether reasonable for even an expert at examinations to insist he cannot be mistaken, and that such and such a case is entirely free from complications. In too many cases in which, at an examination (even with the patient under the influence of an anæsthetic) it had been thought there existed a simple case of displacement with no complication, at a subsequent operation we found ourselves mistaken when the abdomen was opened and the parts directly inspected, to allow one to place too much reliance on anyone's diagnosis as regards adhesions and minute lesions of the appendages.

On the other hand, retrodisplacement of the uterus, even with prolapse of the ovaries, may exist for years without producing a symptom disagreeable to the woman. Eventually it is true many of those displacements give rise to pelvic distress. Given a young woman with such a condition, matrimony intervenes and within three months to a year sexual life causes irritation sufficient in those ovaries to send the woman to a doctor — mark you, it is said *ovaries, not uterus.* If the ovaries were out of the way and uninvolved, the uterus would give little or no trouble. Even where the fundus becomes tender, as is so often the case, it is almost always due to the reflex irritation from the tender ovaries or to the direct adhesion of the fundus itself. A uterus reclining backward, which even in a married woman is giving no trouble, will, if a puerperal septic attack or a gonorrhœa infection supervene, become at once troublesome. Admitted this to be true more often than it obtains in the case of a set of organs in a so-called normal position, who will venture to contend that in any of these cases it is the displaced uterus which is the disease and not the new factor which has entered into the case.

"*The treatment of retrodisplacements*" is then a misnomer; it should be "*the treatment of conditions in connection with which retrodisplacements of the uterus occur as an incident.*" In many, very many of these cases, the displacement of the womb itself can be ignored, and the result will be perfectly satisfactory, as years of abdominal surgery have taught. For ten or twelve years it had been my habit after dealing with the complicating lesion to place a temporary suture in the fundus of the womb, bring both ends of the suture through the entire thickness of the abdominal wall, and tie them together on the skin surface. At the end of six or eight days, a sufficient time for all denuded peritoneal surfaces to heal, the suture was cut and removed and the womb allowed to fall back or not, as circumstances chanced. (A similar operation for a somewhat similar purpose, viz., the prevention of readhesion, is proposed in the January issue of SURGERY, GYNECOLOGY AND OBSTETRICS by Edward H. Ochsner.) This procedure has given me ample opportunity and positive evidence by which I could demonstrate to my students and physicians the truth of the statement that the symptoms did not arise from

the displacement but from the complications, for the reason that the patient could be, and was, presented later with no symptoms, and with the uterus retrodisplaced but movable. Having served its purpose this temporary fixation operation has almost disappeared from my practice and is unlikely to return. In the bad (infected) cases in which Ochsner uses it, both ovaries being removed, I almost without exception perform the amputation hysterectomy, and find absolutely none of the objections or bad results which seem to worry him.

In those cases in which no disease can be found, and again in those in which the disease found has been dealt with by appropriate treatment, and it is in addition desirable to bring a retrodisplaced fundus forward (for instance the ovaries and Fallopian tubes or part of them being left, the peritoneum of the pelvic walls back of the womb and broad ligaments being denuded and bleeding, and where adhesion between them and the fundus would be apt to occur if they were allowed to again come into contact, or where it is desirable to draw up prolapsed ovaries and Fallopian tubes) there is another procedure with which I have been experimenting for the past twelve years or so, and which is, I think, fully established and amply justified by results, and which has taken the place of all other procedures in my practice for this class of cases.

The operation is not new. I first referred to it in a paper in 1902 after a few years' trial only. I have performed it almost constantly ever since, modifying it here and there at times as apparent difficulties arose, and as it seemed necessary to overcome certain objections and certain faults in results, and I find at the present time a completed technique which is, I think, perfect.

Primarily the operation was done empirically with no idea of its true mechanics, and this being so it may readily be appreciated why apparent difficulties were hard to overcome and why changes were necessarily but blindly made from time to time. And yet with it all the general principles have remained the same from the first, viz., "with round ligaments brought through an opening made in the broad ligaments and united behind and to the uterus." The proposition is simple, the resulting advantages only manifest when the procedure is properly carried out. The mechanism is plain, but has never to my knowledge been fully appreciated or fully pointed out even by Webster, who has for the same length of time performed an operation with exactly the same principles but varying slightly in technique. Criticisms of this operation are heard and seen often enough, and it is the utter ignorance of the principles and mechanics involved which is universally displayed in these criticisms which tempts me to put it forward in its proper light.

What is the position and condition of the uterus in the normal female pelvis? The fundus is bent slightly on the cervix and well forward of the direct axis of the pelvis, it is freely movable in all directions within certain well defined limits, moving always with the cervix as a movable pivot. The

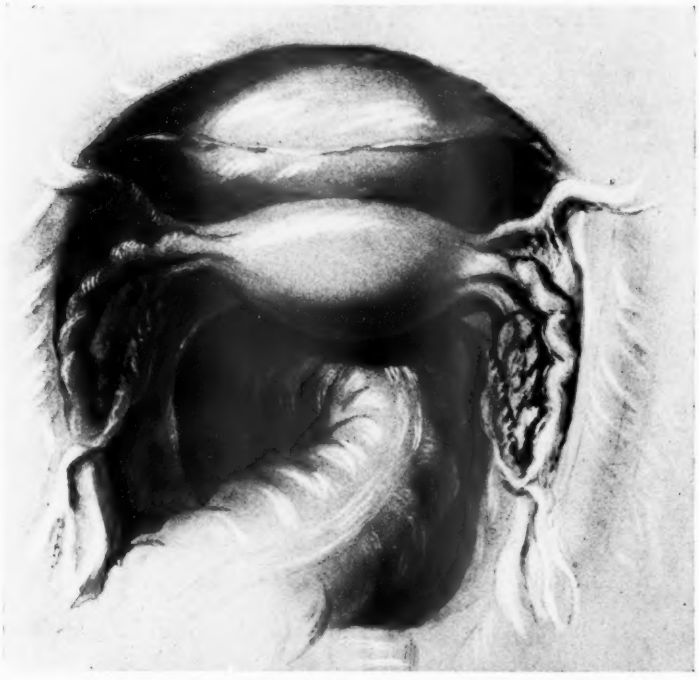


Fig. 1.

whole organ is so high in the pelvis as to allow the top of the fundus to arise well above the ileo-pectoneal lines of the bony pelvis. The ovaries are suspended correspondingly high and rest on the upper posterior portion of the broad ligaments. Any operation which does not take these conditions fully into consideration, and which does not leave the organs approximately in these conditions and positions, cannot be considered as ideal.

Long and learned articles are written on the supports of the uterus and theories are propounded as to the relative influence of each on the production of the lesion. Operations are conceived for the correction of this overstretched ligament or that elongated one on the supposition that this is the main or only one affected. Great stress is laid on the involution of the elongated ligaments after the operation and their return to a normal supporting consistency. But in all the confusion of anatomy, physiology, and pathology, sight is lost of the fact that in the vast majority of cases there is a general relaxation and stretching of all the supports, often of the whole of the abdom-

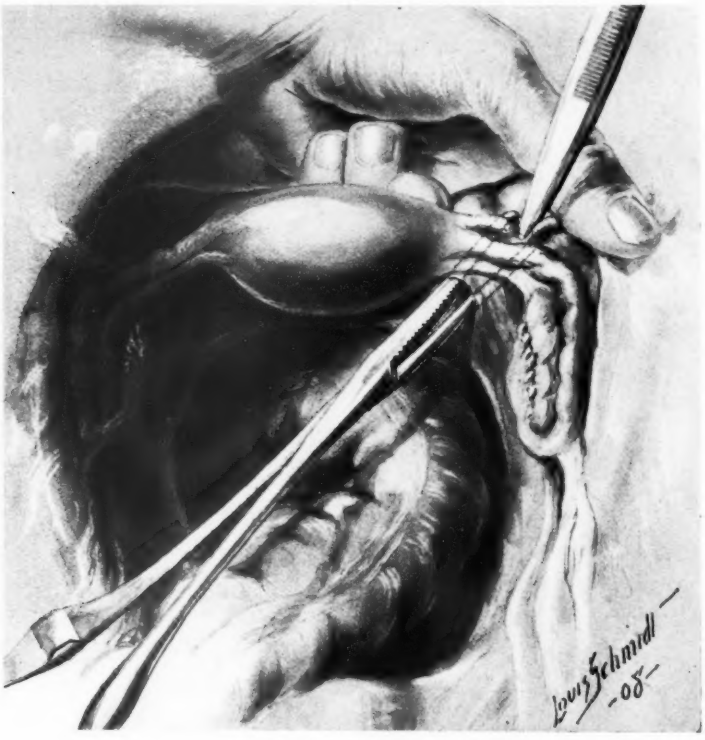


Fig. 2.

inal contents, and that the uterus as well as the ovaries, lie down as it were, in the pelvis, limp and inert; the stretching of the ligaments is that of overstretched rubber, not that of hypertrophy of tissue which may subsequently involute. The loss of support is a complex one, not merely the defect of one ligament, and the ratio of loss in each individual element of support is impossible of estimation, nor is it worth while to try to estimate it. The point is not, can we tell just what is the degree of relaxation of one of the utero-sacral ligaments or both, what that of the right utero-vesical ligament or both, or what that of the broad ligaments, and then attempt to devise an operation for each and all these supposed defects, but to recognize the fact that before us is a group of organs which for some reason or other (it matters not) are in a false position, and being so are exposed to traumatism and other influences which will eventually, or have already brought about a train of symptoms

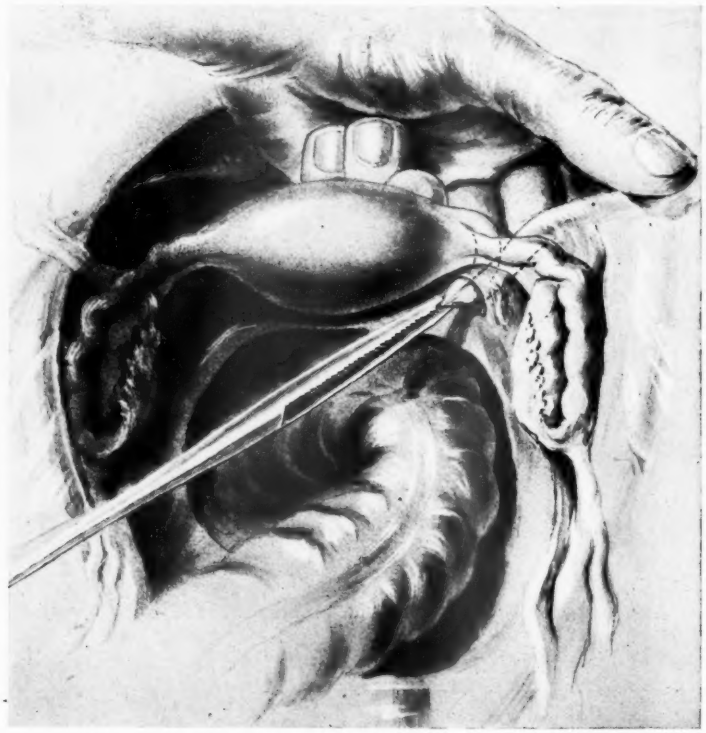


Fig. 3.

which it is very desirable to abate. These organs having lost the use of their natural supports, can we successfully substitute others to take their place? This is exactly what happens in the case of every operation for retrodisplacement with which I am familiar, which has given even a measure of success, and this is universally the ignominious end of all the long drawn out and fine spun theories of the causes and factors at issue. These are the lines on which I have worked most successfully and is the basis of the accompanying operation. The round ligaments are used as artificial supports in an artificial manner to accomplish what nature originally accomplished, viz.: "A uterus with the fundus forward of the direct line of the axis of the pelvis, freely movable in all directions on the cervix as a movable pivot, the fundus raised up to and above the ileo-pectineal lines and the ovaries swung correspondingly high and free from all attachments on the posterior side of the

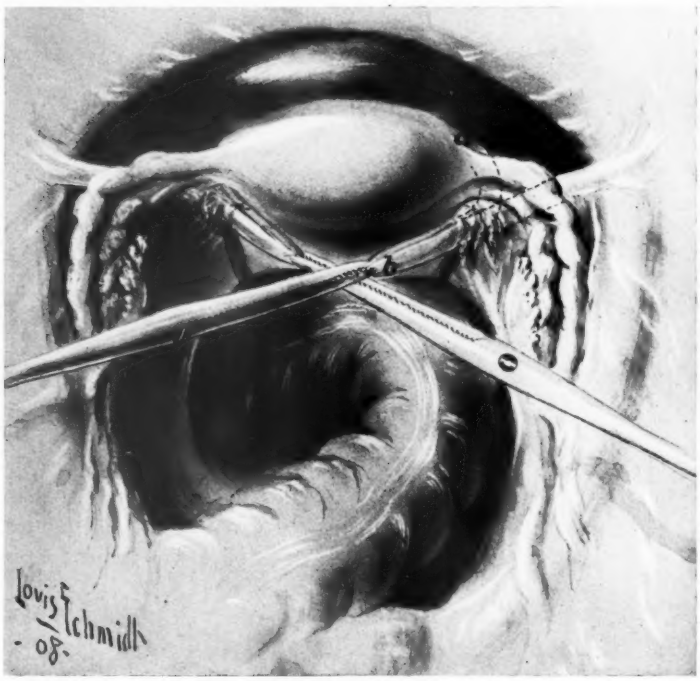


Fig. 4.

broad ligaments." The simple procedure of drawing the round ligaments around the posterior side of the uterus, fastening them together as they meet, and then fastening them to the uterus itself at a selected point, fulfills perfectly each and every one of these indications.

A study of the accompanying illustrations, which were drawn by the artist at the operating table, will render the operation and its results perfectly clear.

Fig. 1 shows the uterus and appendages low in the pelvis and inclined backward. This is brought out more clearly by contrasting Fig. 1 with Fig. 2, in which one side is raised by the fingers well up above the ileo-pectineal lines, while the opposite side remains low down in the pelvis. Fig. 2 also shows the fundus drawn well forward and away from the sigmoid flexure.

In Fig. 2 is seen the hæmostatic forceps perforating the broad ligament from behind to its anterior aspect on which lies the round ligament. A

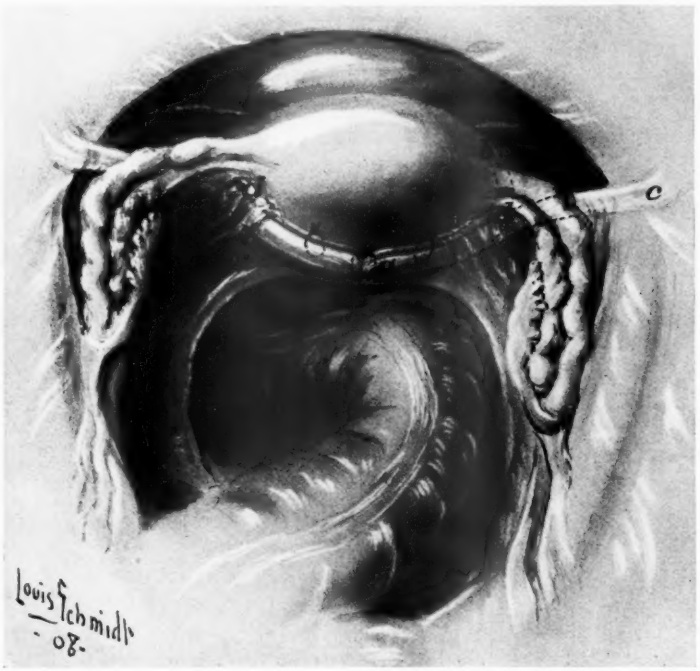


Fig. 5.

pair of tissue forceps are grasping the round ligament and carrying it into the bite of the perforating hæmostatic forceps.

Fig. 3 shows the round ligament in the grasp of the hæmostatic forceps and in process of being drawn through the broad ligament to its posterior aspect.

Fig. 4 shows both round ligaments drawn to the posterior portion of the broad ligament and approaching each other.

Fig. 5 shows both round ligaments united to each other, and at two points to the uterus itself, and the operation is completed.

Contrast Fig. 1 with Fig. 5 and note the following points: The distance from the fundus to the sigmoid, the distance from the fundus to the pubis, the height of the fundus and ovaries as shown by the shadows and the ileo-pectineal lines. Also, the ureto-sacral ligaments. It will readily be recognized how well forward of the axis of the pelvis the fundus is brought, how high it rises in the pelvis, and how high are the ovaries and Fallopian tubes.

The point at once arises, what forces are brought into play to bring these

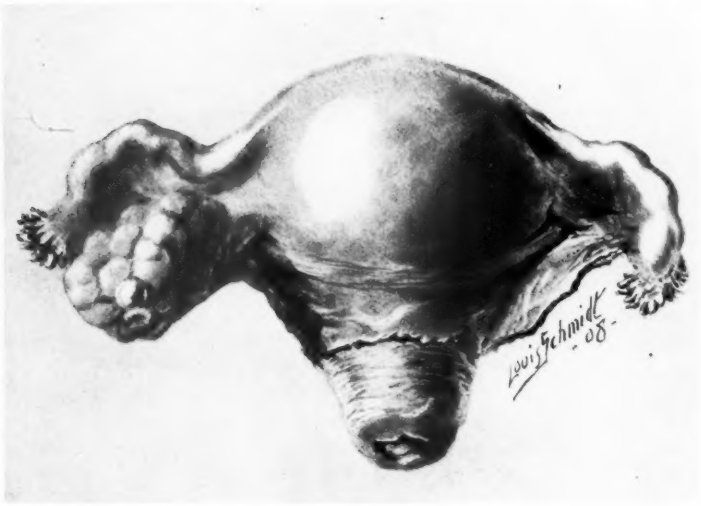


Fig. 6.

organs into such perfect position, and how do they act to retain them there?

The uterus is upheld by the encircling round ligaments (Fig .5, *a*, *b*).

The ovaries and Fallopian tubes are upheld by the passage of the round ligaments under the ovarian ligaments (Fig. 5, *d*).

The uterus is held forward by three forces, viz.:

1. The pressure of the intra-abdominal force on its posterior surface.

2. The resistance of the encircling band of round ligaments (Figs. 7, 8, 9, *b*, *c*, Fig. 5, *a*, *b*).

3. The pull forward and downward of the round ligaments at their attachment at the uterine cornua. (Figs. 5 and 9, *b*, Fig. 10, *a*).

The whole structure is steadied by those portions of the round ligament running to the normal abdominal attachments. (Fig. 9, *a*, *c*, Figs. 5, *a*, *c*).

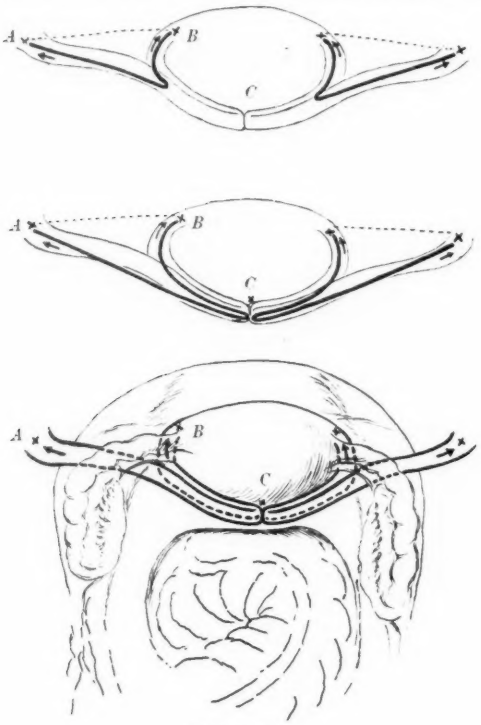
It will be noted by reference to the illustrations (Fig. 2) that the forceps perforate the broad ligament close to the uterus and directly under the ovarian ligament. This is essential to the best results. A too low perforation in the broad ligament will give an unsatisfactory result. When the round ligaments are adjusted and brought snugly together posterior, the ovarian ligament rests on each round ligament and without so much as touching the ovary or Fallopian tube, always and with absolute certainty insures the proper and safe elevation of those organs. This is the only operation of which I know that secures this result, and if one recognizes the truth that it is often the

prolapsed ovary which induces the symptoms, they must readily recognize the great advantage of this. When the uterus is thrown forward by almost any other operation the ovary will usually rise in the pelvis with it and the displacement of both organs will be corrected at one and the same time. But every operator will recognize the fact that there is a certain large group in which the ovarian ligaments are relatively more stretched than those of the uterus, and in spite of the fundus being brought forward the ovaries are still prolapsed.

The elevation of the ovaries is not accomplished alone by the general elevation of the uterus, but is materially aided by the rolling forward a quarter of a circle or more of the top of the broad ligament, due to the pull backward of the round ligament as it passes through the hole in the broad ligament and the more the posterior pull of the round ligament, the greater the tendency to the rolling forward of the top of the broad ligament, and the consequent elevation of the ovary and Fallopian tube. I have in no case seen this occur to such an extent as to in any way endanger the patency of the tube. This whole mechanism is perfectly plain when seen in the living subject and is perfectly compatible with every known mechanical law.

The second fact accomplished is that of the elevation of the uterus and everything connected with it (Fig. 5). This is brought about, of course, on principles somewhat similar to those which would be involved in grasping a boy in one's arms and lifting him up. This requires fixed points from which to act. In the operation these points are the attachment of the round ligaments to the abdominal wall, their attachments to the fundus uteri, their attachment throughout the whole course through the broad ligaments, and finally the artificial attachments made by the operator as they are brought together behind the uterus and stitched to that organ.

It has been offered in criticism that the round ligaments will be stretched by the weight put upon them, and that the weakest part of the ligament, viz., the abdominal wall end, is the part which carries the whole weight. Only failure to have performed the operation and ignorance of the mechanics can justify this criticism. If it be contended and believed that the weight of the uterus and pelvic organs can be sustained by the longitudinal pull on the round ligaments, as is the case in the Gilliam, the Mayo, the Montgomery, the Alexander, and every other modification of this class of pure suspension operations, in how utterly prejudiced a condition must be the mind which fails to grasp the fact that the downward pull of the organs against the lateral resistance of the full length of the ligament has only a fraction of the chance of overstretching, which obtains in the longitudinal pull. In the operations of the class just mentioned, pure and simple suspension operations all of them, the full success of the result depends entirely on the suspension, not another element entering into the result. Furthermore, in these operations one and all the pelvic organs are lifted by sheer force into the abdominal cavity, there to be suspended in a position they were never intended to be,



Figs. 7, 8, 9.

with lessened mobility, and the full weight of the downward drag *permanently* dependent alone on the integrity of the round ligaments.

Contrast this condition with the operation under consideration. The uterus is lifted up and sustained by the encircling round ligaments as shown in Figs. 7, 8, and 9. But only *temporarily* is this full force put upon the round ligament. The fundus is thrown forward of its center of gravity and as the patient lies on the operating table with the abdomen open, the fundus remains forward where the hand places it (Fig. 5). In this position the intra-abdominal force is exerted on the posterior surface of the fundus forcing it the further forward and the more surely holding it there. Gravity also aids this action.

What occurs when the patient arises? On certain movements the fundus has a tendency to go backward. Should this occur the intra-abdominal force would soon be exerted on the anterior surface of the fundus and the uterus would be forced to a posterior position.

In studying the mechanism of the forces at play it is soon evident that two things prevent this accident.

1. The sling back of the uterus formed by the round ligaments properly adjusted meets the force temporarily urging the fundus posteriorly and obstructs that action.

2. The force of the fundus against the encircling round ligaments causes a pull on the ligaments at their attachments to the anterior uterine wall and the harder this pull the more the tendency to draw the top of the fundus forward and downward and to antagonize the tendency backward.

In other words we have two forces acting against and neutralizing the efforts of the uterus to go backward and it is impossible for the one to be brought into play without the other instantly operating to aid it.

Until some effort of the individual causes the situation to arise which attempts to force the uterus backward, the uterus remains quietly forward by combination of gravity and intra-abdominal force and no tension is put on the round ligaments whatever, other than that which is being exerted to uphold the uterus. In other words, for the most part there is no pressure exerted on the round ligament at all and it is only called upon *intermittently* and *temporarily* to exert itself and when it does so at all it offers two points of resistance, in the obstruction posteriorly, and in the pull forward and downward at the uterine cornua, thus subdividing the work put upon it.

In all the suspension operations without exception, the full weight of the pelvis organs are *permanently* dragging on the round ligaments in the most vulnerable direction.

Those parts of the round ligament running to the abdominal walls are only slightly affected, in this process they act mostly as guy ropes to the whole structure as similar ropes act in holding up a derrick, and in this operation are only brought into action intermittently and temporarily. There is, therefore, absolutely no chance of their becoming overstretched as has been suggested. At one time in the process of the evolution of the operation I severed these ends and did not use them at all, so little did they seem to enter into the mechanism

For a full understanding of these important forces study Fig. 10. This represents a lateral section of the uterus, broad ligament, and appendages. Take the diagramatic lines A B C. When force is exerted on C backward (as would be the case if the uterus were forced back against that point) the effect on A will be downward and forward, provided B be a fixed point. A mere glance at the diagram and the line of the forces makes this clear; it is purely a question of mechanics.

In the operation:

C, of the diagramatic line, is represented by the point of artificial attachment of the round ligaments on the posterior part of the uterus (Fig. 5 *a*).

A, in the diagram is represented by the natural uterine attachments at the cornua of the uterus on its anterior face (Fig. 5, *b*).

B, in the diagram is represented by the ovarian ligament, which is relatively a fixed point (Fig. 5, *d*).

Although the ovarian ligament is not an absolutely fixed point, yet it is sufficiently so to supply the point of fulcrum and produce the result pointed out.

The moment the uterus attempts to leave its forward position it meets with the resistance of the obstruction of the encircling ligaments as well as the forward and downward pull at the anterior cornual attachments. It thus rides in a cradle as it were movable backward and forwards without being ever able to get back beyond its center of gravity or posterior to the direct line of axis of the pelvis. Hence the third force at play (the intra-abdominal force) is constant in its pressure on the posterior surface of the uterus and thus trebly insures a permanent result. But one possible thing can happen to spoil the operation: The complete breaking down of the suturing, which is so simple as to make that accident inconceivable.

In adjusting the ligaments as they are brought together back of the uterus care must be taken first, to draw the inner circle of the doubled ligament (Fig. 4, *a*, *b*) snugly about the uterus as the organ is held in a good anterior position by the hand. They are then sutured together by a single stitch. The last step is to fix the loop to the uterus by a stitch or two at a point which will insure its anterior position. It is best not to make the attachment at a point higher than necessary to secure an assurance that the fundus cannot double backward over the encircling round ligaments. This point is found with little difficulty. If this precaution is not followed, the result may be unsatisfactory.

End results are the final test of every operation, after all is said and done, and time alone will tell its staying qualities.

This operation has been performed by myself and my assistants between 100 and 200 times. I have knowledge of some twenty to thirty pregnancies following its performance. In no case has there been the slightest irregularity, a number of the women having had trouble in former pregnancies.

In no case subsequently examined could it have been told an operation had been performed had it not been known.

A few of the early cases imperfectly performed did not result satisfactorily. In no case where the operation was satisfactorily performed has this occurred.

I know of no operator who has once learned the details of the operation and performed it properly who is not still doing it. In my own work it is done to the exclusion of all others, in properly indicated cases. I have yet to hear of a single objectionable feature of the operation or its results, from any source whatever.

It is the only operation extant which meets all the indications as laid down in the first part of this paper, and is the only one which does not depend on a single force to make it successful. It is not as easily and quickly done

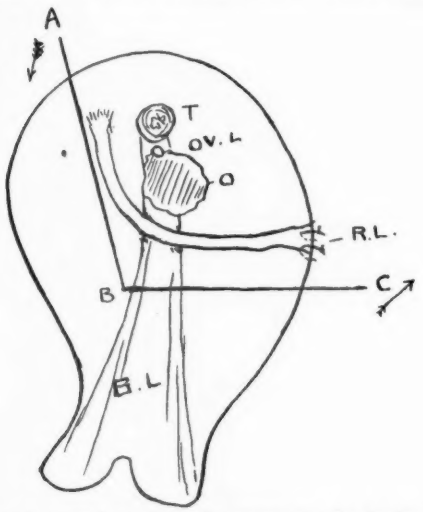


Fig. 10. When force is exerted on C by the uterus pressing backward, the effect A will be a full downward and forward, if B be a fixed point.

as a ventrosuspension, but it requires no more skill than is easily possessed by any surgeon who is competent to open the abdomen.

In suspension operations, such as the Gilliam and others of its type, one is constantly hearing of suppuration. In fact, Gilliam advises against it in infected cases. I have never seen nor heard of a suppuration in the above operation, nor do I see how it could occur, as the only traumatisms are the three suture points and the perforation of the broad ligaments at points where they are as thin as tissue paper.

I have been fortunate after the interval of a year in being able to obtain the specimen from a patient upon whom I had performed this operation. The anatomical position was perfect, but the symptoms were not cured. The woman came for further relief and I performed a hysterectomy with the result of perfect cure. The specimen is shown in Fig. 6. Those portions of the round ligaments encircling the uterus posterior have so blended with the peritoneum covering the uterus, that except for their transverse radiation they would be taken for the normal condition. At every other point the round ligaments retain their normal characteristics; even as they pass through the broad ligaments, they are round, and full, and thick. The portions of the round ligaments in particular extending to the abdominal wall (the thinnest portion of the round ligaments) were unchanged. The uterus stood well up and forward in the pelvis, was as perfectly movable in all directions as a normal uterus, and this in spite of the fact that it was a very large and heavy organ. The transverse lines are brought out more prominently in the illustration than obtain in the specimen.

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

A REGULAR MEETING WAS HELD FEBRUARY 12, 1909, WITH THE PRESIDENT, DR. A. E. HALSTEAD, IN THE CHAIR

ADHESION OF THE SPINAL CORD; ECHINOCOCCUS CYST OF THE SPLEEN; DISLOCATION OF THE HIP; FRACTURE OF THE ARTICULAR SURFACE OF THE HEAD; SPONTANEOUS ANASTOMOSIS OF SMALL INTESTINE FOLLOWING TRAUMA; COMPLETE PROLAPSE OF THE RECTUM

BY WILLIAM E. SCHROEDER, M. D., CHICAGO, ILLINOIS

ADHESION OF THE SPINAL CORD

This patient, Mrs. S., gives a good family history. She came under the observation of Dr. Patrick, who referred her to me with a diagnosis of probable tumor of the spinal cord. She had right-sided sensory disturbance in the region which corresponds to the third dorsal; then she had left-sided spastic paralysis involving the left leg only. These were largely contractures. The trouble began about two years ago, the patient having fallen in the meantime. The fall, however, had no bearing upon her case whatever. She has never had any infection of any kind. I mention these details because of the future findings. These are the only disturbances she had: Inability to walk; spastic contracture of the left leg, and contractures of the ankle about two years ago, followed with a slight sensory disturbance on the right side. I took out the second, third, and fourth dorsal arches and found on the left side of the cord a broad, dense adhesion about $\frac{1}{16}$ of an inch thick extending from cord to dura. I divided the adhesion and did a little thing which I found very valuable, i. e., frequently patients suffer from shock, because of loss of spinal fluid, and I put gauze in the canal above and below, which stopped the flow of fluid, and then opened the dura and divided the adhesion. She made an uninterrupted recovery from the time of the operation, in that the spasms and pain immediately disappeared. She is able to walk, but feels a little uncertainty. She has had a fall or two. She has sensation and motion. She is able to get around very nicely. As to what brought this condition on, I am unable to say. I merely show the patient and report the case as one of unusual lesion of the cord, and would like to make a further report on her case at some time in the future.

ECHINOCOCCUS CYST OF THE SPLEEN

This young man came under my observation three years ago, the 23d of November. There is no occasion to show him, except possibly to point out the scar and to mention the incisions made for the removal of the tumor. When he came under observation he had a tumor in the left hypochondriac region which was diagnosed as a tumor probably arising from the spleen. He came on account of pressure symptoms. I operated on him, and removed a tumor which weighed six pounds and fourteen ounces, and proved to be a sterile echinococcus syct of the spleen. This was the diagnosis made by Dr. Zeit. As to the blood findings, he developed a slight anemia, the leucocytes went up to 25,000 and he made an uninterrupted recovery. The blood count to-night is 6,400,000 reds, and 10,000 whites. He has enjoyed excellent health since the operation. Occasionally he has sharp, shooting pains, which may be due to some adhesions.

DISLOCATION OF THE HIP

The next patient is one who fell from some height, striking over the trochanter. Dr. Potter took an X-ray of the case. The patient came in with a fracture of the acetabulum or a dislocation of the hip. This is the third time I have encountered a case of this kind, and in the other two cases there was inability to pull the hip out and keep it out. I got permission to operate, and made an

incision through Poupart's ligament, going down back of the muscles, and finding a hematoma in front of the head under the muscles, with spicules of the acetabulum sticking out at right angles to it. The hematoma shows very nicely in the X-ray plate. We found a fracture running through the ramus at that point, cleaned it out, and then by flexing the thigh forcibly upon the adbomen and using a the femur as a lever, we found it would strike the brim of the pelvis and could be gotten out easily (adduction). I put it in and out four or five times; but the question arose as to the best means of keeping it there, and this proved to be by extreme flexion, extreme adduction, and verticle traction. I put him in a cast with a large stick of wood from the heel to the tuberosity of the ischium; another one from the knee to the shoulder putting him in a solid cast and keeping him there for six weeks. He has a good result. He can flex his leg fairly well. He can walk around very nicely. I show you the line of incision. He can rotate the leg in and out. The spicules of bone I pressed back from the inside. As to whether it is necessary to operate on these cases or not, is to be decided in each individual case. The hemorrhage in this case was much more extensive than we had anticipated.

FRACTURE OF THE ARTICULAR SURFACE OF THE HEAD

The next case is another hip case, transferred from the neurological service. The X-ray plate shows a fracture of the articular surface of the head. The strange part of the plate is that, clear as it is, it seems as though there is another piece of bone at the point I show you. When we operated on him, from the X-ray that was taken, I thought it might be possible to nail the head. The piece of bone was tilted slightly so that it cast a large shadow. It has a smooth surface because of non-union. The bone was thrown out of joint, and it had rotated into the balance of the arch which is attached, and this is an exostosis which springs from the acetabulum. I might mention the mechanism of these cases here. Very frequently these patients fall and strike the joint and the trochanter is thrown back forcibly, the ligamentum teres becomes tense, the anterior capsule pressing on the bone, and producing a fracture, or it may rotate the other way, anteriorly. It seems to me this rotated posteriorly and upon striking the acetabulum at the point punctured. The patient can walk now without crutches fairly well. While he is improving daily, he is by no means well. Before this he could not walk without crutches at any time.

SPONTANEOUS ANASTOMOSIS OF SMALL INTESTINE FOLLOWING TRAUMA

The next patient is one I showed before the Clinical Society, and I want to show him again. He was caught between the bumpers of two cars and was laid up for three weeks, during which time he was quite sick. He vomited once and became very much distended. No medical aid at this time. He had an enormous peristaltic wave when he came under our observation some time later, which looked as though it was due to a dilated colon. It was a very much distended, small intestine running across the abdomen and then stopping at this point (indicating). I operated on him, and he showed many interesting things. He had a distended small intestine, about four times the diameter of the normal gut, and as we came down lower and lower, we found that the gut became red, and there was a trace of fibrin, as though there was a low-grade peritonitis. The intestine ran into a loop and had an anastomosis at this point (indicating), about the size of a split pea. The spontaneous anastomosis occurred between the end of the small intestine. The other end was attached by a small adhesion and all that it was necessary to do was a lateral anastomosis. Evidently we had had a detached mesentery and a puncture of the intestine had become gaynulus. This was done and he made an uninterrupted recovery. He still complained of pain, and when the American Clinical Society met here, I operated on him again, and the large opening in the mesentery was sewn, and it seems as though that really was not the cause of his pain, yet there was no other attributable cause. The opening between the intestines was large enough, and that seems to have accomplished the object, so that he is now free from pain and feels well.

COMPLETE PROLAPSE OF THE RECTUM

The next patient I wish to show you is a man who had a complete prolapse of the rectum of three or four inches. The ordinary operation for complete prolapse of the rectum has been quite unsatisfactory in my hands; so I made a transverse incision, as we might do for prostatectomy, and went down to the levator and muscles, which were very lax and sewed the levator anis. As this sketch shows, I pulled the levator ani down and the gut completely up, sewed the levator ani to the rectum, and then to each other. You will observe that when the patient strains very hard all you can see is a red mucous embrane. The result is more than gratifying, because of the enormous prolapse he had. I do not claim anything new for this operation. It would have been a failure

if we had had a prolapse of the mucous membrane only. From our work on the female pelvis, we know that the levator ani forms the most important part of the pelvic floor, in man this is also true. So far the result has been entirely satisfactory.

DR. D. W. GRAHAM: I would like to ask Dr. Schroeder whether he tried to enucleate the cyst or took out the whole spleen?

DR. SCHROEDER: The entire spleen was a cyst There was no healthy tissue to be found anywhere.

DR. DEAN D. LEWIS: Did you get a section of that adhesion of the spinal cord?

DR. SCHROEDER: I did not. It was an extremely short adhesion, pulling the cord out of its course a trifle.

DR. LEWIS: Do you not think the paralysis was due to displacement of the cord?

DR. SCHROEDER: Undoubtedly, from traction, as there was no tuberculosis, no trauma. The woman fell on her face and hurt the small of her back.

DR. GRAHAM: What is the age of the patient from whom you removed a part of the head of the bone?

DR. SCHROEDER: He was 45.

DR. GRAHAM: The reason I ask that question is because the internal surface of the bone taken out looks very smooth.

DR. SCHROEDER: Six months elapsed before he came for operation in which time the fractured surface was worn smooth, not being united.

DR. GRAHAM: Had he been walking on it?

DR. SCHROEDER: He had been moving the leg in bed, but not walking.

DR. GRAHAM: That smoothness would seem to be the result of his efforts at walking.

DR. WILLIAM FULLER: The case of intra-pelvic dislocation of the femur presented by Dr. Schroeder is one of much interest, and he is to be congratulated on the good functional result obtained. It would be interesting to have Dr. Schroeder tell us why, in the other two cases of this kind to which he has referred, the results were so unsatisfactory. He states that in these two case the bones could not be retained in place after the reduction was effected; that the deformity and displacement would recur. On Tuesday of this week it was my privilege to see precisely such a condition as the one presented by the doctor to-night. The patient was a strong, vigorous young man, about 27 years old. He fell a distance of 30 feet, striking the ground in the upright position, with the body inclined more to the right than to the left side. The head and neck of the right femur were driven through the acetabular floor, and occupied a position well within the pelvis as was shown by the X-ray. The floor of the acetabulum appeared to be punched out. This dislocation was exceedingly difficult to reduce, but showed, upon reduction, no tendency to recur.

DR. WLILIAM E. SCHROEDER: I did not get the femur in good position in the first two cases I encountered, because it seems the muscles of the thigh, the adductors, are so strong, and the fascia running over the trochanter, that the head seems to go back into its old position. I do not know why. This is the only case I have treated in the manner I have described. The two others were absolute failures, the bone going entirely back into the pelvis, locking the trochanter on the acetabulum. Both patients suffered from ankylosis of the hip. The same is true in this case, in that just as soon as we extended the leg under an anesthetic, placed it back where it belonged, there was enough pressure from the outside, and no resistance from the inside, to force it through every time. I do not know why it is, except the adductors pulling and the fascia pressing.

DR. EDWARD H. OCHSNER: I would like to ask Dr. Schroeder about the incision he made in the last case. I could not see the scar from where I was sitting, and did not understand the way of approach to the levator ani muscles.

DR. SCHROEDER: I made a transverse incision. I went down, found the rectum, followed that until I struck the levator ani muscles, with part of the levator ani still surrounding the rectum. The levator ani was low down, and this made me think that a part of the pathology lay in the relaxation of the levator ani muscle. There was no difficulty in getting there, as everything was well down. The levator ani comes down within an inch and a half of the anus. It came down very low in this case, and a transverse incision was the one that appealed to me in this particular case.

DR. HOLLIS POTTER exhibited several X-ray plates and skiagraphs, showing stones in the kidney, the ureter, and bladder.

DR. JOSEPH F. SMITH, of Wausau, Wisconsin, read a paper entitled "Sarcoma of the Skull." (See paper, p. 375.)

DISCUSSION

DR. ALLEN B. KANAVEL: It may be interesting to draw attention to the fact in connection with the trophic disease called leontiasis ossea, that of 35 cases reported in the literature, 3 showed sarcoma apparently developing entirely separate from the original disease. I would also direct attention to the point that Le Dentu thinks that this disease bears a distinct relation to sarcoma, although the sections were looked upon by every pathologist who examined them as not sarcoma.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.
WM. C. DANFORTH, M. D. — M. G. SEELIG, M. D.
AIMÉ PAUL HEINECK, M. D. — GEO. E. BEILBY, M. D.

Some Observations on Surgery of the Gall Bladder and Bile Ducts. W. G. HAMILTON, M. D. *The American Journal of Medical Sciences*, 1909, Vol. 137, No. T, pg. 110.

The author emphasizes the following points. When the disease is confined to the gall-bladder, danger from operation is minimized. When the common duct has become the seat of obstructive and infectious cholangitis, the operative risk is often greatly enhanced, for one may have a patient who is suffering both from chronic sepsis and from cholemic intoxication as well.

The infective character of the bile should be borne in mind in operations upon many of these sufferers from affections of the biliary channel. Failure to bear this in mind may lead to soiling of the peritoneum and a fatal peritonitis

Rigidity of the right rectus muscle near its upper attachment may have some significance. Either indigestion or something in the way of stomach distress is often manifest in the history of gall-bladder cholelithiasis.

One may find tenderness one inch to the right and one inch above the navel in many of the common duct cases (Robson). Tenderness over the gall-bladder is quite likely to be demonstrable, if there has been a recent exacerbation of a cholecystitis.

Cramps or pains through the gall-bladder to the right infrascapular region are often observed in gall-bladder or cystic duct cases.

Increasing experience suggests to us the importance of preserving the gall-bladder when salvable. The question as to the possible ultimate restoration of its function and that of the cystic duct as well should be carefully weighed before doing cholecystectomy.

A. B. EUSTACE.

Extension Treatment of Fracture of the Leg (Modification of Hennequin's Apparatus). E. C. RIEBEL, M. D., Chicago. *Quarterly Bulletin of Northwestern University Medical School*, Dec., 1908.

Operative treatment not applicable as yet as a routine procedure in difficult simple fracture. Permanent reduction best obtained by continuous extension. Elimination by this method of bad features of rigid immobilization mainly: impairment of function and delay of sound callus formation by preventing a reasonable play of the bone surfaces against each other. Hennequin's apparatus best applicable in oblique fractures of the leg, also in comminuted with interposition of fragments and in compound fractures. The principle features of Hennequin's frame are traction upon the leg in a horizontal position with flexion of the femur. To this are added the advantages of a double inclined plane without change of the horizontal position of the leg, thus transposing the gravity of the leg into traction. The apparatus is expensive and may be replaced by a simpler one omitting this last feature. A frame is made of gaspipe 9 inches high, 8 to 8½ inches wide, and 20 inches long. This consists of two lateral and two cross pieces. It is open at either end above. To this is joined a U-piece for the femur 13¼ inches long, somewhat wider than the frame and movable upon it to allow adjustment at any angle. Both are covered with duck cloth. Extension is made by means of a plaster shoe. Application requires great care to avoid decubitus. Sufficient padding must be applied. Shoe is made by circular application of plaster of paris bandage. Shoe is then covered with oiled paper or rubber cloth and a posterior molded splint applied from the calf to the sole of the foot. The apparatus should be perfectly level when placed in the bed. By cutting a window in the splint and using duck strips for a hammock, wounds on the posterior surface of the leg may be dressed in situ. Extension is made by means of a pulley. The cord is attached to the loop of bandage incorporated in the shoe. About 4 pounds traction will suffice in fresh fractures to begin with; this may be increased by a pound every other day up to seven pounds. In older fractures 9 to 10 pounds are required. Traction is tolerated better by day than by night. Any surplus above 6 pounds should be removed at night and added again by day.

A Point in the Successful Use of the Stomach Tube. WALTER H. BUHLIG, B. S., M. D., Chicago. *Quarterly Bulletin of Northwestern University Medical School*, Dec., 1908.

Walter H. Buhlig has shown that the marks or rings upon stomach tubes that are to indicate the distance to which the tubes are to be passed are placed at such variable distances from the tip of the tube that each tube should be properly marked in this respect.

The Prognosis after Operative Treatment of Spina Bifida (Die Prognose der Operation der Spina Bifida). THEODOR BOETTCHER. (From The Breslau Clinic). Prof. Garré, Director. *Beiträge zur Klinischen Chirurgie, Band 53.*

Boettcher reports 64 cases, which occurred in Breslau from 1891 to 1906, or were seen by Garré in Rostock or Königsberg. The cases are classified as follows:

1. Total or partial Rhachischisis.

2. Cases in which the cord has closed but a vertebral defect exists through which a hernial protrusion occurs, in which the contents of the spinal canal participate in some degree.

a. Meningocele.
b. Myelocystocele
c. Myelocystomeningocele.
d. Spina bifida occulta.

Facts which bear upon prognosis:

1. Age. Four operated cases were more than 1 year old. These all lived. Of 8 which were 2–14 days old all died. Patients 2–7 weeks old showed a mortality of 22 per cent. The remaining cases, aged 2–8 months, showed a mortality of 33 per cent.

2. Sex. Of 64 cases 40 were females or 62.5 per cent. Of these 25 were operated, and 12, or 48 per cent died. Twenty-four cases, or 37.5 per cent were males. Of these 14 were operated and 29 per cent died.

3. General condition, the weaker ones naturally succumbing easily.

4. Location. Those occurring in the sacral region or lowest lumbar segment where no cord exists are safer, since one has to do with a simple meningocele. On the other hand, the closer to the anus, the greater the danger of infection.

5. Perforation of the sac means death from meningitis.

Radical operation is recommended, with opening of the sack. A plastic closure of the vertebral defect must be made if possible. Cord anomalies must be dealt with so as to produce relationships as nearly normal as possible. Post-operative meningitis occurred in 6 of 39 operated cases. Two of these were cases of spina bifida ulcerata.

The sudden decrease of intraspinal and intracranial pressure from sudden release of fluid at operation is to be feared. No sudden death at operation occurred in this series but in a few cases death after operation was ascribed to this cause. Post-operative hydrocephalus occurred 6 times. Boettcher believes this to have an infective basis, and to be in reality, a meningitis serosa diffusa.

Taking all forms of cases together operation results were as follows: Of 64 cases 39 (61 per cent) operated. Cases with severe motor or sensory disturbances of the lower extremities or of the bladder or rectum were not operated. Infected and perforated cases were also excluded. Of 39 operated cases 25, or 70 per cent died. Immediately consequent on the operation 13 or 52 per cent died. In 6 of these meningitis was the cause, in 4 post-operative hydrocephalus, and in 3 it was unknown. Ten of the remaining deaths occurred later, of other diseases. In 12 of 39 cases, or 33 per cent, a complete cure is recorded, without paralysis or sensory disturbance. These were cases of meningocele only. It does not seem possible to improve motor or sensory defects through attempts at correction of cord anomalies.

Prognosis of particular types.

1. Meningocele. Of 13 cases 12 were operated. Of these 9, or 75 per cent, lived.

2. Myelocystocele and Myelocystomeningocele. Of 17 cases 11 were operated. Four of these showed no paralytic condition at time of operation and in one a perfect result ensued. Two cases died at once. In 4 cases paralyses came on after operation.

3. Total and partial rhachischisis.

Total cases cannot live. Of 8 partial cases, 6 showed ulcerations or paralysis of lower extremities, bladder, or rectum and were not operated. They all died. The other 2 were operated. One case showed paralysis of the lower extremities after operation and died of meningitis. The other gradually acquired paralysis of the legs, decubitus, and died 10 months later.

4. Spina bifida occulta. Only one case was operated. Result was successful. W. C. DANFORT

Auto and Isotransplantation, in Dogs, of the Parathyroid Glandules. W. S. HALSTED, M. D., *The Journal of Experimental Medicine*, Vol. XI, No. 1.

Halsted reviews the prevous work that has been done in this direction and then presents the results of his own experiments, which cover a period of about two years, in which sixty dogs were used and more than 130 parathyroid glands transplanted. This study "was undertaken with a view to determine the course to be pursued by the surgeon when a parathyroid gland has been accidentally removed or deprived of its blood supply, and in the hope that it might be attended with such success as to justify the attempt to transplant this glandule from man to man." These transplantations were made, either into the thyroid, the spleen, or in or behind the rectus muscle of the abdomen, and were both auto- and iso-transplantations.

The thorough manner in which these experiments have been pursued lends especial value to the author's deductions which he states briefly in the following summary:

1. The autotransplantation of parathyroid glandules into the thyroid gland and behind the musculus rectus abdominis has been successful in sixty-one per cent of the cases in which a deficiency greater than one half has been created.

2. In no instance has the autotransplantation succeeded without the creation of such a deficiency.

3. Iso-transplantation has been uniformly unsuccessful.

4. Parathyroid tissue transplanted in excess of what is urgently required by the organism has not lived.

5. One parathyroid autograft may suffice to maintain the animal in good health and spirits for many months and possibly for years.

6. Excised or deprived of their blood supply in the course of operation upon the human subject, parathyroid glands should, in the present state of our know-

ledge, be grafted, and probably into the thyroid gland.

7. Complete excision of the thyroid lobes in dogs may be well borne for a year or more. The myxœdema which usually has manifested itself within a few weeks has not increased after the first few months. May it subsequently diminish with the hypertrophy of accessory thyroids?

8. Parathyroid tissue is essential to the life of dogs, as has been conclusively proved by the result of excision of the sole, sustaining graft.

There may be found, perhaps, in our experiments, explanation of the fact observed by others (Enderlen, Payr) that, when transplanted, thyroid preserves its integrity less well than parathyroid tissue. In the instances recorded the amount of thyroid gland excised may have been insufficient to make possible the fullest success of the transplantations; and particularly so when we consider the extent of the hypertrophy of which the thyroid gland seems capable. GEORGE E. BEILBY.

The Relation of Tetany to the Parathyroid Glands and to Calcium Metabolism. W. G. MACCALLUM, M. D., AND CARL VOEGTLIN, M. D. *The Journal of Experimental Medicine*, Vol. XI, No. 1.

In this experimental investigation, the authors have attempted to throw some light upon the chemical nature of the processes which result from parathyroidectomy and the chemical nature of the functional activity of the parathyroid. While their studies are not completed, yet they present in this communication many interesting and valuable facts, notably among which is the demonstration of the efficacy of a soluble salt of calcium in combating the symptoms of tetany induced by parathyroid privation.

Their conclusions are in part as follows:

1. Tetany occurs spontaneously in many forms and may also be produced by destruction of the parathyroid glands. Recent researches tend to demonstrate an intimate relation between the various forms of tetany and relative or absolute insufficiency of the parathyroid glands.

2. The parathyroid glands are independent organs with definite specific function. Whether or not this function is intimately related to that of other organs of internal secretion is not as yet proven.

3. The number and distribution of the parathyroid glands varies. Failure to produce tetany experimentally is probably due to the fact that some parathyroid tissue remains after an apparently complete extirpation. When extirpation is complete tetany appears, even in herbivora. Only a very small amount of parathyroid tissue is required to prevent this.

4. The effect of the extirpation of the parathyroid glands may be annulled by the introduction of an extract of these glands even from an animal of widely different character. The active principle is associated with a nucleo-proteid in the extract and may be separated with this nucleo-proteid from the remaining inert albuminous substances. Its effect in counteracting tetany appears some hours after injection and lasts several days.

5. The parathyroid glands contain no considerable amount of iodine. The parathyroid extract is not an iodine-containing compound.

6. In tetany there is apparently some disturbance of the composition of the circulating fluids ordinarily prevented by the secretion of the parathyroid, which disarranges the balance of the mineral constituents of the tissues. Possibly this consists in the appearance of an injurious substance of an acid nature, for such tetany may be relieved by extensive bleeding with replacement of the blood by salt solution. No actual poisonous material has, however, been demonstrated by the transference of the blood of a tetanic animal to the veins of a normal one.

7. Numerous researches have shown the important relation of the calcium salts to the excitability of the central nervous system. Their withdrawal leaves the nerve cells in a state of hyperexcitability which can be made to disappear by supplying them with a solution of calcium salt.

8. Tetany may be regarded as an expression of hyperexcitability of the nerve cells from some such cause.

9. The injection of a solution of a salt of calicum into the circulation of an animal in tetany promptly checks all the symptoms and restores the animal to an apparently normal condition.

10. Injections of magnesium salts probably have a similar effect but this effect is masked by the toxic action of the salt.

11. An injection of sodium or potassium salts has no such beneficial effect, but rather tends to intensify the symptoms. This is true also of the alkaline salts of sodium which were studied especially in respect to their basic properties.

12. The effect of calcium is of value in human therapeutics in combating the symptoms of spontaneous forms of tetany and in relieving the symptoms in cases of operative tetany and thus tiding over a period of acute parathyroid insufficiency until remnants of parathyroid tissue can recover their function or new parathyroid tissue can be transplanted. It is in this way an important and convenient ally of the method of inecting parathyroid extract.

13. In general the role of the calcium salts in this connection may be conceived of as follows: The salts have a moderating influence upon the nerve cells. The parathyroid secretions in some way controls the calcium exchange in the body. It may possibly be that in the absence of the parathyroid secretion, substances arise which can combine with calcium, abstract it from the tissues and cause its excretion and that the parathyroid secretion prevents the appearance of such bodies. The mechanism of the parathyroid action is not determined, but the result, the impoverishment of the tissues with respect to calcium and the consequent development of hyperexcitability of the nerve cells, and tetany is proven. Only the restoration of ealcium to the tissues can prevent this.

14. This explanation is readily applicable to spontaneous forms of tetany in which there is a drain of calcium for physiological purposes, or in which some other condition causes a drain of calcium. In such cases the parathyroid glands may be relatively insufficient. GEORGE E. BEILBY.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. CLARENCE WEBSTER, M. D. — E. C. DUDLEY, M. D.
J. C. HOLLISTER, M. D. — GEO. DE TARNOWSKY, M D
GERRY R. HOLDEN, M. D. — CAREY CULBERTSON, M. D.

Vesicular Moles and Chorionepithelioma. PAZZI. *Annali di Obstetrica*, March, 1908. From abstract, *Jour. of Obst. and Gyn. of the Brit. Emp.*, August, 1908.

Pazzi sums up our present knowledge of vesicular moles and chorionepithelioma in the following conclusions:

1 and 6. Vesicular mole and chorionepithelioma are not pathologically identical, but the clinical and histological features they have in common betray a relationship between them.

2. In the vesicular mole we find a rarefaction of the basic tissue of the villus, granular degeneration of the connective fibres, with or without œdema, and the presence of mucin; there may or may not be hyperplasia of the investing layers.

3. In the chorionepithelioma there is, histologically, a proliferation of the chorionic epithelium and a malignant invasion of the blood-stream; there may be secondary vesicular degeneration.

4. Chorionepithelioma in almost half the cases known has been associated with vesicular mole and may completely take its place.

5. Under certain conditions of environment (autointoxications of pregnancy) either growth may originate in the migration of active, chronic epithelial cells.

7. The scholastic distinction between living and dead mole (Pestalozza) remains valid.

8. As the origin of the investing layers of the chorionic villus is still under discussion, the term chorionepithlioma, though now generally employed, may yet be discarded.

9. Vesicular mole and chorionepithelioma are genetically distinct from the pseudomorphous growths, occurring independent of pregnancy, and even in teratomata in either sex.

10. Ovarian lesions stand in no casual relation to vesicular mole or chorionepithelioma, but the frequency of their association is strong evidence of functional relations between the ovaries and the uterus.

11. That chorionepithelioma is parasitic in its nature, has not been proved.

12. Our knowledge of the clinical course, prognosis, and therapeutic indications of the vesicular mole and of chorionepithelioma are not affected by any new ideas as to their pathogenesis.

The Opsonic Index in Gynaecology. FOSSATI. *Annali di Ostetricia*, June, 1908.

In fifty laparotomies of a gynæcological nature Fossati made use of opsonic tests and publishes his results. Streptococci, staphylococci, and bacilli coli were the germs used for the reason that they are those microbes most often present in sepsis after laparotomy. Death ensued in eight of these cases, and in each the index showed a deviation farther from the normal than in those cases that recovered. Oscillations in the index, when taken at different times, were characteristic, an ascending oscillation apparently corresponding to a decrease, and a descending oscillation to an increase, in the virulence of the micro-organism.

The writer concludes that (1) even when actual foci of infection do not exist, certain women requiring gynæcological operations often reveal a subnormal resistance to infection; (2) a normal opsonic index with respect to various germs usually present in operative sepsis may be estimated as one element indicative of a favorable prognosis; (3) oppositely, a subnormal index gives cause for a guarded prognosis; (4) the opsonic reaction, even in strictly localized infections, tends to follow the laws commonly observed in general septic infections; (5) the nature of the organism as well as its influence is often indicated by a low index relative to one of the different micro-organisms used for examination.

Fossati therefore argues that the routine estimation of the opsonic indices may be of great value to the surgeon in determining whether operation should be undertaken or not, whether it should be performed during ascending or positive oscillation of the index, or whether it should be postponed so that the patient's power to resist infection may be increased by raising the opsonic activity of her serum by sero-therapeutic measures undertaken during negative phases of the index.

CAREY CULBERTSON.

Die Placenta Marginata und ihre Entstehung. VON DR. P. SFAMENI, Professor und Direktor der Universitats-Frauenklinik in Perugia. Mit 11 Abbildungen im Text. *Verlag von S. Karger*, Berlin, 1908.

This monograph of seventy pages takes up the subject of placenta marginata systematically. The anatomy is considered fully, illustrated with microphotographs and schematic drawings. Statistics and

tables are then presented, showing the clinical value of the condition, particularly with respect to the occurrence of abortion. Ferroni's view, that placenta marginata in no way disturbs fœtal developemnt, is upheld. Post-partum hæmorrhage is perhaps a little more frequent than in the normal state. After a thorough review of various theories regarding the development of placenta marginata, the author considers five of them in detail and then states his own conclusions. This is, in brief, that endo-ovular pressure and normal expansion of the uterine wall keep the developing chorion in proper relation to the decidua, but that a failure of these two factors allows the ovum to sink in deeper, as it were, thus permitting an infolding of the chorion alone, or of both chorion and amnion, producing the so-called placenta marginata. The fact that this condition is oftenest found co-existent with oligo-hydramnion, Sfameni takes as clinical evidence favoring his theory. CAREY CULBERTSON.

A Contribution to the Hysteric Fever. MAX SCHWAB. *Monats für Geb. & Gyn.*, B. xxviii, H. 4.

Hysteric fever is in the majority of cases attributed either to deception on the part of the patient or false judgment on the part of the physician. The necessary postulates before we can call a fever hysteric are: (*a*) an exact and strict control during the taking of the temperature, (*b*) positive exclusion of other affections, as tuberculosis, influenza, etc., (*c*) there must not be any senseless jumps in the fever curve and also no temperature, like 48°, 50°, 64° Celsius, as these high temperatures are always suspicious of simulation. In spite of the use of this severe critique there are certain cases of hysteric fevers observed. Report of a case. A girl 25 years old had complained for years. In 1904, she suddenly became ill, vomiting, fever, and intense pain in the right lower abdomen. She was not operated upon, on account of a suspicion of hysteria. Several weeks afterwards, in the short space of ten minutes, an enormous swelling of her lower abdomen developed, and the patient travelled from one clinic to another. In 1906, she still complained of indigestion, pains in the stomach, meteorisme, and was operated upon in another hospital. Appendix, genital organs, and the whole abdomen were found in perfect condition. No improvement after the operation. On Oct. 7th, the symptoms of a complete ileus developed, bowels did not move, she vomited, and the patient was apparently in a collapse, the meteorisme was enormous. On October 14th, fever was observed for the first time, 38.6 (rectal temperature taken in the presence of the physician). In spite of the diagnosis of hysteria, an operation was considered, but it was concluded to wait. The next day the patient was greatly improved, the fever had disappeared. The symptoms of ileus gradually disappeared, but it was apparently impossible to produce a bowel movement. The temperature during the next three weeks of observation varied between normal and 102.8, 39.1 Cels. rectal temperature taken under careful control. At the same time acute circumscribed œdema appeared, especially upon the arms, which regularly disappeared in about 24 hours, also very marked hyperæsthesia and a typical colica mucosa.

Faradisation of the abdomen with a strong faradic current quickly brought complete recovery. The author believes that the diagnosis of hysteria is justified and based, firstly, upon the colica mucosa, secondly, upon the hyperæsthesia, thirdly, the circumscribed œdema, fourthly, the result of the electric treatment, fifthly, the pseudo appendicitis. The long-continued constipation might find an explanation in starvation, the patient having taken only a very small amount of nourishment; this also explains the collapse. The diagnosis of hysteric fever is more positive if during an operation, performed on account of some symptoms, the organs are found to be in perfect condition. On the other hand, the author warns the exclusion of real organic diseases in a typical hysteric, and lays stress upon the fact that hysterics will quicker develop a higher fever than others.

H. SCHILLER.

Ueber Appendicitis Während Schwangerschaft und Geburt. VON GERHARD RENVALL. Aus der gynækologischen klinik von Prof. Dr. Otto Engström in Helsingfors. *Verlag von S. Karger*, Berlin, 1908.

This article, originally published in the "Mitteilungen," bund vii, from Engström's clinic, now appears in monograph form. The author first considers the relation of pregnancy and labor to inflammatory reaction in the appendix, and to acure attacks as such. Next the diagnosis and then the treatment is taken up. Renvall's conclusions are in accord with the best teaching on this subject in this country. He reports twenty-three new cases, which, together with two hundred fifty-three collected from the literature, give his work a distinct value as an article of reference.

CAREY CULBERTSON.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. — Ralph Waldo Lobenstine, M. D.
Heliodor Schiller, M. D. — Hugo Ehrenfest, M. D.

Accidental Heart Murmurs in Pregnant Women.
(Ueber akzidentelle Herzgeräusche bei Schwangeren.)
R. Link. *Muenchener Med. Wochenschrift*, No. 15, 1908.

In the course of examination of 330 pregnant women, Link came upon 41 cases of accidental systolic heart murmurs. It was always loudest at the base, to the left of the sternum in the second interspace. The second pulmonic sound was generally not accentuated. In twenty-six of these cases, the abnormal sound disappeared after delivery. He states that the origin of such murmurs is to be found in mechanical causes, and believes that the pulmonary artery is slightly kinked by the change in position of the heart, since it has frequently been shown that in pregnancy the heart is pressed anteriorly closer to the chest wall and lies more transversely than in the non-pregnant state. The reason for its non-occurrence in every case being the difference in firmness of the abdominal walls, size of the uterus, and size of the woman herself. Differentiation from ordinary mitral insufficiency is made by the presence of full compensation, the anamnesis and auscultation. The location of the greatest intensity of the murmur and accentuation of the second pulmonic sound are important differential diagnostic points.

C. V. Bachellé.

Results Obtained with an Anti-placenta Serum.
F. Mirto, Milan. *La Ginecologia Moderna*, Genoa, Oct., 1908.

Mirto reports six new cases to those presented at the Milan congress in 1906.

All six were cases of deformed pelves requiring premature induction of labor. Mirto accomplished this by deep intra-muscular injections of a serum obtained from an ass mmunized with an extract of human placenta. He does not think that these injections produce an intoxication but believes the serum has a specific action on uterine contractions.

Geo. de Tarnowsky.

The Influence of Syphilis upon the Offspring.
By Dr. Gräfenberg, *Archiv, f. Gynækologie, band 87, heft 1.*

Despite the well-known fact that syphilis is responsible for by far the greatest number of intra-uterine deaths, it was not until recently — since the discovery of the "Spirochæta pallida" — that any great progress was made towards the solution of this important subject.

Gräfenberg has shown that the "Spirochæta pallida" may be found in the organs of the macerated fœtus, as well as in the non-macerated and but recently dead infant. The organs in which the Spirochætæ pallidæ are found in greatest numbers are the lungs, spleen, liver and kidneys. Until the fact became known that these organisms of syphilis could be demonstrated in the macerated fœtus, it was impossible, in many cases, at least, to obtain accurate data as to whether or not any given case of maceration was due to syphilis; inasmuch as the several changes in the fœtal organs ascribed to syphilis are by no means pathognomonic.

Gräfenberg claims that if the "Spirochætæ pallidæ" are not found in badly macerated fœtuses, it is safe to conclude that the etiological factor is not syphilis. If the case is a syphiliticone, the demonstration of the "organisms" is in no way modified by the existing maceration. In the great Frauenclinic in Kiel it was possible to demonstrate the "Spirochætæ" in the organs of 39 out of 50 macerated fœtuses, by means of the "Levaditi" stain or a modification thereof, by Sacurane.

One can conclude from this that about 80 per cent of macerated fœtuses are of syphilitic origin. With improved laboratory technique this figure may prove to be even higher.

On the other hand, out of 44 congenitally luetic infants, 38 were born macerated, i. e., about 92 per cent of congenitally luetic infants come into the world in a macerated condition.

Only two of the six cases of this list born alive failed to show at birth any signs of syphilis. In the remaining four born alive congenital syphilis was diagnosed.

The great mass of congenitally luetic infants are born *premature*. In the list of 39 cases of maceration in which the organisms were found, only three reached full term. In this list, but few mothers presented definite signs of syphilis.

The author calls further attention to the fact that it is both difficult and unsatisfactory to demonstrate the "Spirochætæ" in the placenta (only in a scant 40 per cent of the cases), but the great diagnostic future is the discovery of the "organisms" in the umbilical cord. They are to be found mostly in the walls of the blood-vessels and *especially* in the part of the cord situated near the umbilicus. The "Spirochætæ" may be very

few in number at the placental end of the cord, and yet be in large numbers, in the umbilical end. This rule holds good whether the fœtus is macerated or not.

The possibility of a syphilitic mother infecting the healthy offspring does not end with the termination of intra-uterine life. *She may infect the child both during labor and after birth.*

The infection of the child during labor may arise either from *specific cervical secretion* or from secreting *condylomata lata.*

It was found that in four syphilitic women (2 pregnant and 2 non-pregnant) with active manifestations of syphilis, the "Spirochæta pallida" could readily be detected in the secretion of the cervix; while in five other syphilitic women, with symptoms in abeyance, *no* organisms were found in the cervical secretion.

We conclude, says Gräfenberg, that in secondary lues, with symptoms, Spirochætæ pallidæ are regularly found in the secretion of the servix and that thereby the child may be infected with syphilis during labor (if not previously infected).

This discovery will also throw some light upon those cases which, though presenting no lesions in the genital organs, still infect, at any time.

If infants present luetic lesions for the first time several weeks after birth they should not, as heretofore, be classified off-hand, as cases of "congenital syphilis."

If a child is born with "congenital lues," it should be possible to find some luetic manifestation in the skin, etc., or at least possible to demonstrate the Spinochæta pallida at the umbilical end of the cord. If no Spinochætæ are found and *no* signs of lues are found, then the child is *not born syphilitic.* If luetic symptoms develop somewhat later, they are due to acquired syphilis.

Inasmuch as practically all such cases develop a coryza as the first or as one of the first symptoms, it is more than likely that — frequently at least — a small primary lesion exists in the nose.

Von Frese believes that a large percentage of cases of "Ozena" with atrophy are due to "hereditary or acquired syphilis" beginning in this way, with a small primary lesion in the nose. Those infants showing first the signs of tertiary syphilis are not necessarily cases of "late evidence" of congenital syphilis. The majority of "congenitally luetic" cases (as stated above) that are born alive will present very *early* tertiary symptoms if these are to develop at all. These cases with late tertiary symptoms are in all probability, cases of "acquired syphilis," i. e., acquired during labor or soon thereafter.

Gräfenberg further believes that no children are born "*immune* to syphilis"; but if free from lues, have merely failed to become infected.

How is the fœtus infected? From numerous experiments it seems likely that the ovum is infected at the time of conception. It seems probable that the Spirochæta pallida enters the ovum with the entrance of the spermatazoön, but *not in* the latter.

If the mother is not infected at this time she develops an immunity, according to Colles' Law.

The exceptions to this law are to be found in those cases where she is infected during labor through abrasions, or after the birth of the child.

A syphilitic child may thus infect the non-specific mother, during labor or while nursing.

Finally, it may be said that "a healthy child will doub less be born if the mother develops syphilis but a short time before its birth." In these cases the child should *not* be allowed to nurse.

RALPH WALDO LOBENSTINE

Effect of Ether and Morphin upon Uterine Contraction During Labor. (Experimentelle Untersuchungen über Uteruscontractionen bei der Geburt, sowie über den Einfluss des Athers und des Morphiums auf dieselben.) WASENIUS. *Archiv für Gynakologie, Bd.* LXXXIV, Hft. 3.

Wasenius' results confirm those of Schatz and Westermark. He states that at the beginning of labor the intra-uterine pressure is weakest and that during the stage of dilatation, it gradually increases. During the stage of expulsion, a part of the forces are exerted in moving the fetus along the birth-canal so that a direct and exact comparison is impossible. The interval between pains also becomes less as the labor progresses. As to the effect of ether, he says that deep anæsthesia increases the interval between pains and decreases the length of the contraction. Both obstetrical and surgical degrees of anæsthesia decrease the sensibilities. Deep anæsthesia lessens the strength of the uterine contractions and weakens the abdominal pressure. At first ether seems to stimulate the strength of the pains. On cessation of the anæsthetic, the contractions return to their original strength after about 20 minutes. Morphine in doses of 0.015 gm. hypodermically at the beginning of the period of dilatation, slow the progress of labor, inasmuch as the interval between pains is lengthened, the duration of the contraction is shortened and the maximum intra-uterine prêssure is decreased. On the other hand in doses from .015 to .02 gm. at the end of the first stage of labor or during the expulsive stage, it has no, or at least very little, effect upon the progress of labor.

C. V. BACHELLÉ.

The Effect of Rest During Pregnancy upon the Weight of the Fetus and upon the Duration of the Pregnancy. (Einfluss der Ruhe einer schwangeren Frau auf das Gewicht des Fötus und die Dauer der Schwangerschaft.) PAUCET. *Province med.*, No. 19, 1908.

As the result of his observations, Paucet draws conclusions which differ from previously accepted ideas. It is his impression that every pregnant woman should in the interest of her offspring, take the maximum amount of rest during the latter part of her pregnancy. Rest for one month is sufficient to give satisfactory results and will cause the child to be stronger and will show in body weight. At any rate he believes that the woman should give up all kinds of work if she can not take absolute rest; those women whose previous pregnancies have been pathologic, should especially follow the rule. His results in the clinic have fully confirmed his theory.

C. V. BACHELLÉ.

BOOK REVIEWS

DISEASES OF THE SKIN AND THE ERUPTIVE FEVERS. By Jay Frank Schamberg, A. B., M. D. Pp. 534, with illustrations. Philadelphia: W. B. Saunders Company.

This is a splendid work, not voluminous so as to be unwieldy, but complete enough to be comprehensive and valuable. The text is readable and interesting, and the photographic illustrations, which are very numerous, are the best we have seen.

In the part devoted to the eruptive fevers, the general symptoms are briefly described, but the skin manifestations are exhaustively treated. Also there are described the accidental eruptions occurring in the course of such diseases as typhoid and typhus fevers, meningitis, influenza, malaria, rheumatic fever, angina, tonsillitis, and the serum reactions.

Altogether this book should be of much value, both to the student and to the practitioner.

HENRY W. CHENEY.

THE RECTUM. Its Diseases and Developmental Defects. By Sir Charles B. Ball, M. Ch., D. R., C. S. I., Hon. F. R. C. S., Eng. London: Henry Frowde and Messrs. Hodder and Stoughton. New York: Oxford University Press, 1908.

The author of this work, which from the standpoint of the bookmaker is well produced by the Oxford Press, announces that this work is not a revision of his former work The Rectum and Anus, Their Diseases and Treatment, published in 1887, and the second edition in 1894, but a new book upon the same subject, although on different lines.

The course of Lane Lectures on Diseases of the Rectum, delivered at San Francisco in 1892, and the Erasmus Wilson Lectures on Adenoma and Adeno-carcinoma of the Rectum, delivered at the Royal College of Surgeons, England, in 1903, suggested to the author that a work founded mainly upon these lectures might possibly prove to be more acceptable than an attempt to produce a bulky monograph on the subject.

In order to carry out this idea, and at the same time to keep the work as concise as possible, it has been necessary to omit historical accounts of the evolution of modern treatment and the description of operations now obsolete, to avoid repetition of notes of cases of a similar kind, not to encumber it with a mass of more or less useless statistics, and while endeavoring to give full credit to others whose work is made use of, not to overweight the book with authorities.

The illustrations are a feature of the work; except a few which are purely diagrammatic, they are all taken from actual cases of specimens. The plan largely adopted in obtaining those of clinical cases, the stages of operations, etc., was to have stereoscopic photographs taken, and from these half-tone drawings were made. In his way the flatness of ordinary photographic reproduction is avoided. The drawings were made by Mr. James Murray, of Edinburgh, with few exceptions. The pathology is illustrated by photo-micrographs of unusual clearness. The reproduction of the illustrations have all been excellently carried out by the publishers, the original drawings having lost but little of their original merit in the process of reproduction. The following subjects are treated in the volume:

Anatomy of the Rectum and Anus, Developmental Defects; Embryology of Rectum and Anus, Varieties, Treatment; Diagnosis of Rectal Disease; Infective Diseases; Ulceration; Fistula; Stricture, Treatment; Irritable Ulcer or Fissure; Prolapse; Piles, External and Internal Piles; Benign Tumors; Cancer, Symptoms, Treatment; Colotomy; Foreign Bodies; Injuries; Neuroses; Pruritis Ani; Diverticula.

RÖNTGEN RAYS AND ELECTRO-THERAPEUTICS. By Mihran Krikor Massabian, M. D., Philadelphia and London: J. B. Lippincott Company, 1908.

The object of this book, as indicated by its title, is to present clearly and concisely the more important facts pertaining to electro-therapeutics and the Röntgen rays.

The initial portion of the work is devoted to the subject of electro-therapeutics, whose compendious character, it is believed, will appear to the practical physician. Beginning with the definition of electrical terms, this division of the work gradually leads the reader to an elaborate description of high frequency currents, which have recently opened up so fertile and promising a field. The introduction of debatable questions and math-

ematical formulas has been studiously avoided, and no space has been encumbered with the recital of fanciful theories or those of a controversial nature.

An exhaustive study of the Röntgen rays follows. The author has bestowed much care to a description of the apparatus employed. The technic of radio-photography is treated of at length.

A striking feature which will materially add to whatever merit the work may possess, is the introduction, in its final pages, of a study of the technic employed and the remarks made by many of the leading exponents of Röntgen therapy, both in this country and in Europe.

LECTURES ON GENERAL OBSTETRICS. Dr. Heinrich Bayer, Extraordinary Professor at Kaiser Wilhelm University, Strassburg, Germany. Schlesier and Schweikhardt, 1908.

To take up a work on which a man has spent the best and most thoughtful years of a methodical and well-directed life is one of the satisfying pleasures that soothes and blesses the heart of man.

Such a comfort is presented to the earnest scientific student in the monumental "arbeit" of Professor Bayer, which he is modestly pleased to call "lectures."

The book represents years of the most thoughtful and painstaking care in the preparation and section of specimens, and judicious deductions therefrom, which mark the product as the true child of Bayer's busy, scientific, and well-stored mind.

It is difficult to say which appeals most to the reader, the profuse, beautiful, and extremely accurate illustrations or the calm, logical, and flowing demonstrations which they elucidate.

Each is masterly, and both combine to produce this epoch-making work.

The book is designed in seven parts, the third of which is now complete, and considers the evolution, anatomy, and physiology of the female genital tract, with labor and the puerperium.

In order the plan develops logically from the egg, the urinary system and sexual glands and sexual differentiation in the fœtus, through the phylogenetic and ontogenetic growth of the pelvis, with its statics, dynamics, and an exhaustive pathology to the gross anatomy of the abdomen and soft genitalia.

The latter, of course, subdivides into muscular architecture, external genitalia, uterus and tubes, ovaries, and then physiologically considers ovulation, menstruation, the secondary sexual organs, and the determination of sex.

The strong individuality and mental grip of the author has bound these diverse and multiple interests into a harmonious and unified structure of rare interest and strength. Neither does the author stray off into the mysterious and often undefined realms of theory, but with the practical obstetrician ever in mind, he holds his abstractions before the eye in their useful relationships, and emphasizes the logical and utilitarian deduction. Menstruation and ovulation, and their intricate relationship to one another, are clearly discussed, the author taking strong stand against the doctrine of "periodical regeneration" advocated by Mueller and Gebhard. His examinations would show that during this period a loss of ciliary epitheleum occurs, which permits the spermatozoa to enter the uterus.

The muscles of the uterus and its blood supply, the origin of the ligaments, and the character and function of the pelvic muscles are exhaustively considered.

One of the most interesting and thoroughly studied chapters concerns impregnation and the determination of sex, a problem which has fascinated the brightest minds, enthralled the most erudite, and baffled all since the world first began to think.

No man living is more competent to speak on this subject or speaks more discriminatingly than Bayer.

The book should not only be in the hands of every obstetrician as a work of reference, but it should be a companion and guiding volume to his work, to aid in its scientific advancement.

C. B. REED.

DIE LEHRE VON DER KONGENITALEN TUBERCULOSE. Mit besonderer Berucksichtigung der Placentartuberkulose. Von Dr. Anton Sitzenfrey, I, Assistenten der Universitatafrauenklinik und Privatdozenten für Geburts hilfe und Gynakologie an der Universitat in Giessen. Mit 28 in den Text gedructen abbildungen. Verlag von S. Karger, Berlin, 1909.

This study of 156 pages represents the work done by Sitzenfrey in the clinics at Prague and Giessen, comprising a thorough and comprehensive consideration of the subject of congenital tuberculosis, with special reference to tuberculosis of the placenta. The hereditary and congenital predisposition towards tuberculosis is first taken up, followed by a short reference to Baumgarten's theory. The germinative infection is then considered. Intrauterine transference of the tuberclebacillus from the mother to the child the author takes up in its various phases, with particular reference to animal experimentation. Upon this

foundation Sitzenfrey reports seven cases which showed positive findings in the placenta, the decidua vera, the umbilical cord, or in the fœtus. This is the most interesting portion of the work and is given in minute detail, the case-histories being presented with the results of the pathological and bacteriological examinations. Of almost equal value, however, is the study of the neat series of cases presented, nineteen wherein the findings were negative. With the bibliography attached, adequate if not complete, the work is essential to one making a study of this subject.

CAREY CULBERTSON.

A SYSTEM OF SYPHILIS. In six volumes. Edited by D'Arcy Power, and J. Keogh Murphy. With an introduction by Jonathan Hutchinson. Vol. II. London: Oxford University Press, 1909.

The second volume of this monumental and important work fulfills the promise held forth in the initial volume. The subjects covered are as follows:

The Surgery of Syphilis. By D'Arcy Power, F. R. C. S., Eng. A short historical account; syphilitic disease of the bones, the joints, the muscles, tendons, and bursæ, the teeth, the mouth and tongue, the rectum, the urethra and prostate, the testicles, the breast, the thyroid gland.

The Treatment of Syphilis by inunction, mercurial vapor and baths; by intramuscular injection of mercury and the organic compounds of arsenic; by the iodides and the iodides combined with mercury.

The Treatment of Syphilis. By F. J. Lambkin, Col. R. A. M. C.; local treatment; treatment of virulent or malignant syphilis; an outbreak of syphilis in a virgin soil.

Syphilis in Obstetrics. By William J. Gow, M. D., F. R. C. P.

GYNECOLOGY AND ABDOMINAL SURGERY. Edited by Howard A. Kelly, M. D., F. R. C. S., and Charles P. Noble, M. D., S. D. Volume II. Philadelphia and London: W. B. Saunders Company, 1908.

The second volume of Kelly and Noble's Abdominal Surgery and Gynecology is before us. A review of the first volume was printed in the January, 1908, issue of Surgery, Gynecology and Obstetrics. The standard of authorship which was found in the first volume, and which is expected from the men responsible for its editorship, is maintained in the second volume.

The following are contributors to the second volume: Brooke M. Anspach, M. D., Joseph C. Bloodgood, B. S., M. D., John M. T. Finney, A. B., M. D., Barton Cooke Hirst, A. B., M. D., Guy L. Hunner, B. S., M. D., Elizabeth Hurdon, M. D., George Ben Johnston, M. D., Howard A. Kelly, A. B., M. D., LL. D., F. R. C. S., Hon. Edin., Edward Martin, A. M., M. D., Floyd W. McRae, M. D., G. Brown Miller, B. S., M. D., B. G. A. Moynihan, M. S., F. R. C. S., John B. Murphy, A. M., M. D., D. S. C., Eng. LL. D., Charles P. Noble, M. D., S. D., Richard C. Norris, A. M., M. D., Albert J. Ochsner, B. S., F. R. M. S., M. D., Eugene L. Opie, M. D., J. F. W. Ross, M. D., Stephen H. Watts, A. M., M. D., J. Whitridge Williams, A. B., M. D., S. D.

The following subjects are covered: Complications following Operations; Cæsarean Section and Porro-Cæsarean Section; Operations during Pregnancy; The Operative Treatment of Sepsis in the Child-bearing Period; Extrauterine Pregnancy; Diseases of the Female Breast; Operations upon the Gall-bladder, Bile Ducts, and Liver; Operations upon the Stomach; Pyloroplasty; Intestinal Surgery; Operations for Diseases of the Vermiform Appendix; Surgery of the Pancreas; Surgical Treatment of Diseases of the Pancreas; Operations upon the Spleen; Tuberculosis of the Peritoneum; Penetrating Wounds of the Abdomen; Hernia; Operations for Inguinal Hernia in Men; The Use of Drainage in Abdominal and Pelvic Surgery; The Surgery of the Ureter; Surgery of the Kidney.

The book is magnificently printed on high-class enameled paper, which brings out the handsome illustrations which so highly merit reproduction.

BOOKS RECEIVED

SEVEN HUNDRED SURGICAL SUGGESTIONS. By Walter M. Brickner, M. D., Eli Moschcowitz, M. D., and Harold Hays, M. D., New York: Surgery Publishing Company. 1909.

GEBURTSHILFLICHER RÖNTGEN ATLAS. Prof. Dr. Med. G. Leopold und Dr. Med. Theod. Leisewitz. Dresden: v. Zahn & Jansch, 1908.

CORRESPONDENCE

THE MOVABLE CÆCUM AS AN IMPORTANT PREDISPOSING FACTOR IN ACUTE APPENDICITIS

EDITOR OF SURGERY, GYNECOLOGY, AND OBSTETRICS:

It seems to me that greater emphasis should be lent intra-abdominal trauma (exclusive of that caused by concretions and the contractions of the ilio-psosas muscle) as the important predisposing factor of a diseased appendix. This assertion is based upon the fact that a subserous appendix (one lacking a mesentery and buried in the coats of the bowel) rarely ever becomes acutely inflamed. It is a fixed organ with perfect drainage. Again the cæcum next to the pelvic colon is the most movable part of the large intestine, and the appendix as it springs from the posterio-internal aspect of the cæcum, enjoys a mobility that is in keeping with the type of cæcum and the length of the meso-appendix. The larger the appendix the more movable this part of the gut; the better developed the meso-appendix, and the larger (usually) the appendix.

I offer this as a matter of personal observation, namely, that the cases of acute catarrhal appendicitis that come to operation, occur in individuals whose cæca are freely movable and can readily be delivered through the abdominal incision.

The adhesions incident to repeated attacks of appendicitis, with involvement of the peri-appendicular structures, restrict the movements of the cæcum, hence the finding of a fixed cæcum in the chronic form of the disease does not preclude the fact that the cæcum was primarily movable, and that its mobility was the predisposing factor in the inception of the disease.

When we recall the histologic and anatomic defects of the appendix, it requires no very great flight of imagination to believe that the acute forms of appendicitis not infrequently follow the eating of indigestable food, because the fermentative intestinal changes excit eperistalsis and overdistend the cæcum which is normally filled with gas. The cæcum is actually floated — it is dislodged, since it lacks a meso-cæcum its movements pull the mesentery of the appendix taut, or rotate it on its axis so as to angulate the diverticulum, interfere with its drainage, or jeopardize its blood supply.

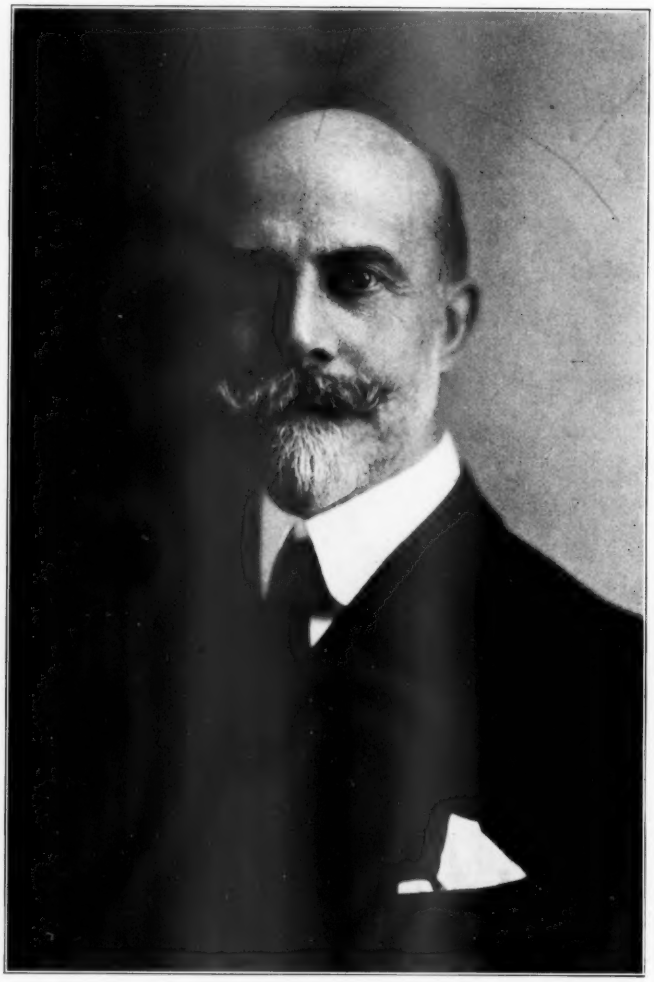
Under etiology we have: First, an anatomic defect — a too-long meso-appendix that permits of great mobility, or a meso-appendix so short as to actually curl or angulate the appendix; secondly, intra-abdominal trauma, secondary to a movable cæcum that displaces the appendix; thirdly, an attack of appendicitis that is in keeping with the permanency of the obstruction and the virulency of the invading organisms.

FRED FLETCHER, M. D.

TEMPORARY VENTROSUSPENSION OF THE UTERUS

EDITOR OF SURGERY, GYNECOLOGY AND OBSTETRICS:

The article on "Temporary Ventrosuspension of the Uterus, by Edward H. Ochsner, B. S., M. D." in the January number of your journal, calls attention to a method which was a part of the a, b, c of the Gynecology I learned from Dr. B. F. Baer while assisting him from 1892 to 1896. He employed this method in a large number of cases during my association with him. Subsequently, in assisting Dr. J. M. Baldy, he also so commonly made use of the same method. In cases in which adhesions of the roughened or denuded posterior surface of the uterus to the raw pelvic connective tissues and viscera was to be avoided, that I have always regarded the method as a fundamental principle in pelvic surgery. The method employed by both of these gentlemen and myself in a large number of cases, differed from that described by Dr. Ochsner only in that instead of using a catgut suture and tying it on the fascia, they employed the lower of the through-and-through silk-worm-gut sutures used in closing the abdominal wall. The suture, after passing through all the layers of one side of the abdominal wall, is next made to transfix a moderate bite of the fundus uteri, posterior to the median line, and then the other side of the abdominal wound is transfixed from within outward and the suture tied as are all the others used for closing the abdominal incision. The suture is removed with the rest from the 6th to the 10th day, unless it is decided in the individual case to let it remain longer. In no case have I heard of any subsequent trouble. THEO. A. ERCK.



J. RIDDLE GOFFE, M. D.
President of The American Gynecological Society.